

FIRE MANAGEMENT PLAN
FOR
AUDUBON NATIONAL WILDLIFE REFUGE
COMPLEX
COLEHARBOR, NORTH DAKOTA

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I. INTRODUCTION

This plan was written to help achieve resource management objectives for the Complex as defined in Goals And Objectives for Audubon NWR (8/29/91), Audubon WMD (8/29/91) and Lake Ilo NWR (5/21/92). These documents can be found in Appendix A.

Audubon Complex consists of four administrative units including Audubon National Wildlife Refuge (Audubon), Audubon Wetland Management District (AWMD), Audubon Garrison Wetland Management District (AGWMD), and Lake Ilo National Wildlife Refuge (Ilo).

Table 1: Administrative Units

Unit	Acres
Audubon National Wildlife Refuge	14,735
Audubon Wetland Management District	22,789
Audubon Garrison Wetland Management District	9.220
Lake Ilo National Wildlife Refuge	3,197

A. Audubon National Wildlife Refuge

Audubon NWR was established in 1956 as a wildlife mitigation area for the Corps of Engineers Garrison Dam and Reservoir Project. Public Law 732 established authority for a General Plan and Cooperative Agreement between the Department of Army and Department of Interior whereby the southern portion of Snake Creek Reservoir became Snake Creek NWR (now Audubon NWR). Audubon Refuge is managed under the National Migratory Bird Management Program with primary emphasis on waterfowl production and maintenance.

B. Audubon Wetland Management District

Audubon Wetland Management District was established administratively for lands acquired through authorization and funding from Migratory Bird and Conservation Stamp Act. These lands were established with the primary purpose of waterfowl production and maintenance.

C. Audubon Garrison Wetland Management District

Audubon Garrison Wetland Management District was established administratively for the management of Wildlife Development Areas (WDA). WDAs are acquired by the Bureau of Reclamation (BR) for the Garrison Diversion Unit (GDU) Irrigation Project. In 1986 the Garrison Diversion

Reformulation Act was passed and is the current project authorization. WDAs were developed by BR to mitigate wildlife habitat losses resulting from the GDU. Upon completion of development, the WDAs are transferred fee title to the US Fish and Wildlife Service (Service) as part of the National Wildlife Refuge System under the National Migratory Bird Program. WDAs are to be managed similar to WPAs, dedicated primarily to the production and maintenance of migratory birds, particularly waterfowl.

D. Lake Ilo National Wildlife Refuge

Lake Ilo NWR was established in 1939 under the Refuge Recreation Act, which states land may be acquired for one or more of the following purposes “...(1) incidental fish and wildlife oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species...”

E. Other Associated Areas

Other **fee title Refuges** in the Complex include McLean NWR, Lake Nettie NWR, White Lake NWR, and Stewart Lake NWR. Fee portions of McLean, Nettie and White Lake NWR were acquired under the Migratory Bird Conservation Act. Stewart Lake NWR was acquired under the Land and Water Conservation Fund Act.

Easement Refuges (private land) were established by executive order with the intent of providing rest areas for waterfowl and other migratory birds. Easement Refuges in the Complex include: Pretty Rock NWR, Lost Lake NWR, Hiddenwood NWR, Lake Otis NWR, Camp Lake NWR and Sheyenne Lake NWR. The Service has no fire suppression responsibility on these easement Refuges.

II. DESCRIPTION OF COMPLEX

A. General Description of Audubon Complex

As stated previously, Audubon Complex consists of four administrative units. Offices for these units are located at Coleharbor, and Dunn Center, North Dakota. Fee title lands in the Complex include 12 Refuges (29,886 acres), 107 WPAs (18,540 acres) and 19 WDAs (11,750 acres). The Complex encompasses three counties east of the Missouri River and 14 counties west of the Missouri River.

Figure 1 Area and Vicinity Maps

The lands surrounding the various Refuges and WPA's are primarily use for farming and grazing of livestock. The lands and waters immediately North of Audubon NWR are part of the Audubon Game Management Area, managed by the State of North Dakota.

B. Topography and Soils

Complex lands east of the Missouri River are divided into three types from west to east: Coteau Slope, Missouri Coteau, and Drift Prairie. Elevations range from 1,700 feet m.s.l. near the Missouri River in southwest McLean County to 2,200 feet m.s.l. in the highest parts of the Missouri River Coteau, which runs northwest to southeast through the three counties. The topography of the Coteau Slope falls rapidly to the Missouri River while the Missouri Coteau is characterized by high local relief, numerous wetlands and rolling hills. The Drift Prairie is mostly level to gently rolling. These land forms are the result of glacial activity occurring approximately 10,000 years ago. Soils in the three counties east of the Missouri River are formed of glacial till or glacial outwash and consist of Max-Williams association, Max-Zahl association, Manning -Lihen association, Wabek association, Williams-Bowbells association, Williams association and Ruso-Bowdle-Wabek association.

The Coteau has irregular terrain with an interspersed of wetlands, native prairie, hayfields, and croplands. The Coteau is of major importance to the production of North American waterfowl. Glacial stagnation caused the topography of the area, with pothole depressions between hills, knobs, and ridges. Soils are loamy, formed in glacial till.

Lake Ilo, White Lake, Stewart Lake and Pretty Rock NWRs are located west of the Missouri River in an area not affected by the glacial activity responsible for the topography of the rest of the Complex. The topography is characteristic of western range land with buttes, rolling grasslands and intermittent streams. Soils are Rhoades-Harriet-Dimmick association and Belfield-Rhoades-Moreau association. Soils range from well drained to very poorly drained, deep, medium textured and fine textured soils that formed in alluvium and clayed sediments.

Effects of Topography on Fire: Land unit boundaries within the Complex were established along jurisdictional lines rather than geographic features. Many of the boundary lines for Refuge units are conducive to fire spreading onto private land due to topography.

Effects of Fire on Soils: Soil erosion resulting from suppression or prescribed fire actions is generally not a problem in the Complex. Occasionally, local cooperators use disc lines as a fire suppression tactic. Disc lines on Complex land for suppression purposes are not recommended due to noxious weed invasion and soil erosion on slopes.

C. Climate

The continental climate of the Complex is characterized by cold winters and hot summers, with rapid fluctuations of temperatures. The cool, dry, subhumid climate has an annual precipitation of 12 to 17 inches. Precipitation is normally heaviest in late spring and early summer, peaking in June. The average seasonal snowfall varies from 30-39 inches. The coldest temperatures vary from -40 F to -47 F to summertime highs up to 111 F. Intense thunderstorms occur frequently in summer. In the winter, snow and high winds bring blizzard conditions to the area. The frost free season generally runs from May 20 - September 15. January is the coldest month and July is the warmest. The prevailing wind flow is from the northwest with an average daily speed of 10 mph. Winds are usually sustained strong breezes rather than occasional gales. Wind speeds are usually highest during the afternoon and lowest at night. Winds of 25-30 mph often last for 6 hours and have been recorded for as long as 15 hours. Wind speeds of more than 30 mph have been recorded to last longer than 6 hours, sustained gusts of 35-50 mph are not uncommon.

Green up of cool and warm season grasses is dependent on precipitation and soil moisture. Drought years often produce little or no green-up for the entire year. Year to year variations in green up and curing of grasses affect fire danger throughout the growing season.

D. Vegetation

1. Prairie, Marshland, and Dense Nesting Cover (DNC)

The Complex is in the mixed grass prairie region of North Dakota. Common native prairie grasses include western wheatgrass, blue grama, sideoats grama, green needlegrass, big bluestem, little bluestem, switchgrass, and prairie cordgrass. Characteristic forbs include pasque flower, fleabane, gumweed, fringed sage, dotted gayfeather, purple coneflower and tall goldenrod.

High prairie sites are usually on well drained soils. Brush species, except for Rosa, are nearly always absent. Grass stands are usually dominated by various combinations of grasses and forbs including; blue grama, needle and thread, fringed sage, blazing star, prairie wild rose, hairy golden aster, pasque flower, threadleaf sedge, and Missouri goldenrod.

Mid prairie sites are usually on level to slightly sloping terrain. Stands on these sites are dominated by various combinations of green needlegrass, Kentucky bluegrass, needle and thread, western wheatgrass, snowberry, chickweed, white sage, yellow sedge, stiff sunflower, and

silver leaf scurf pea. The mid prairie sites are vegetationally the most complex communities in the area.

Low prairie sites are on moderately drained soils. Dominant species include big bluestem, little bluestem, Baltic rush, prairie cordgrass, blackeyed Susan, and Maximilian's sunflower. Less common species of these sites are smooth aster, prairie dropseed, wild licorice, and Canada anemone.

Lowland meadow sites are poorly drained and the water table is usually within the rooting depths of most plants. Water is usually present in the wetlands, and soils are usually inundated for extended periods of time. Dominant species of meadows on the area are northern reedgrass, narrow leafed sedge, foxtail barley, prairie cordgrass, Baltic rush, smooth aster, wild mint, and stinging nettle.

Lowland marsh sites are dominated by slough sedge, white-top, common cattail, hybrid cattail, hardstem bulrush, softstem bulrush, spikerush, common smartweed, sloughgrass, water plantain, and water parsnip. Cattails can be a management problem for maintaining productive wetlands in the Complex. Wetlands become choked with dense stands of cattail.

Portions of the upland areas of the Complex have been seeded to **dense nesting cover (DNC)**. DNC is composed of intermediate wheatgrass, tall wheatgrass, alfalfa, and sweet clover. DNC areas have proven attractive to nesting waterfowl and are known to show increased nest success within their confines. Wildfire or prescribed fire can negatively affect the alfalfa component of DNC if burned during the active growth stage.

Seeded grasses are tame grasses and forbs which have been planted on a majority of previously farmed lands by former landowners or Complex staff. Common grasses are tall and intermediate wheatgrass, crested wheatgrass, Kentucky bluegrass, and smooth brome. Common forbs are alfalfa and sweet clover.

Generally, all of the grassland sites are partially invaded to various degrees by non native Kentucky bluegrass, smooth brome, crested wheatgrass and quackgrass.

2. Noxious Weeds

Leafy spurge, Canada thistle, and wormwood sage are the three most common noxious weeds found throughout all vegetative types. State law

dictates control efforts for noxious weeds and the Complex voluntarily participates in control programs, including the use of prescribed fire. Prescribed fires or wildfires can decrease the spread and density of some noxious weeds depending on several environmental and phenological factors. Initial results of fall burning for control of wormwood sage has been successful on the Complex.

3. Trees

Riparian woodlands, planted shelter belts, and single trees are scattered throughout the Complex. The majority of these areas are associated with Missouri River breaks, intermittent streams, and shorelines of large wetlands. Trees common and or native to the area are cottonwood, green ash, willow, hackberry, Siberian elm and Russian olive. Russian olive and Siberian elm are considered as invading species on grassland sites due to lack of fire. Control of Russian olive and Siberian elm trees with prescribed fire can be effective if the trees are very young.

4. Shrubs

Shrubs common to the area are western snowberry, silverberry, prairie wild rose, chokecherry, and Juneberry. The exclusion of fire has led to shrub invasion of grassland sites primarily by western snowberry and silverberry. Repeated prescribed burns over a 10 year period will result in a reduction of shrub density.

5. Effects of Fire on Vegetation

Effects of Fire on specific vegetation can be found in Appendix B. Additional information concerning effects on vegetation and other natural resources can be accessed at <http://www.fire.org/perl/tools.cgi>.

E. Reptiles, Fish, and Amphibians

Many species of reptiles, fish and amphibians have been documented on the Complex. A Wildlife Checklist has been completed for both Audubon NWR and Lake Ilo NWR (Appendix C).

F. Mammals

Most species of mammals occurring on the Complex have been documented. A Wildlife Checklist has been completed for both Audubon NWR and Lake Ilo NWR (Appendix C).

Effects of Fire on Mammals: Direct impacts of fire on wildlife include disturbance or infrequent mortality of individuals or groups of individuals, particularly slow moving and or sedentary species. The Complex's larger mammals (deer, coyote, fox) will generally move away from fire. However, the availability of suitable adjacent habitat is important for local populations. In actuality, fire in the mixed grass prairie has been shown to favor deer and other mammals (Coppock and Detling, Herman and Wright, and others). Information concerning the effects of fire on wildlife can be reviewed in The Effects of Fire in the Northern Great Plains, prepared by Higgins, Kruse, and Piehl.

G. Threatened, Endangered, and Candidate Species

Audubon Complex contains a number of threatened, endangered, and candidate species. Appendix D. contains a list of Endangered, Threatened and Candidate Species Occurring in North Dakota by County.

Effects of Fire on Species of Special Concern: Fire is a natural and essential part of the Complex's ecosystems. Native wildlife evolved with fire and have developed means of tolerating and/or benefitting from fires. However the sensitive nature of some of the species of special concern require that their habitats be protected from large wildfires especially where adjacent habitat is lacking.

Studies conducted at Lostwood NWR, North Dakota found that **piping plover** nesting success increased as a response to prescribed burning on beaches (Smith, Murphy, Michaelson, Viehl 1993). Increases were attributed to the reduction of live and residual vegetation.

Baird's sparrows have been observed at Audubon NWR and elsewhere in the Coteau areas of the Complex. Baird's sparrows nest in extensive idle or lightly grazed mixed grass prairie in the prairie pothole region. Baird's sparrow populations at Lostwood NWR have increased on areas treated with at least three prescribed burns over a 12 year period.

The **Dakota skipper** has been observed in the Coteau areas of the Complex. Initial surveys for Dakota skippers were started at Audubon NWR in 1996. Dakota skippers were not found in 1996 but the Complex contains areas of suitable habitat. Confirmed sites where Dakota skippers are found will be protected from large wildfires, especially during skipper egg, larval, and pupal

stages. Additionally, confirmed skipper sites will be treated with prescribed fire very carefully. Mosaic unit management, time of year, rotational schedules, and intensity of the burns should be considered. Dakota skippers and other native prairie butterflies can recolonize from adjacent unburned suitable habitat, if timing has allowed host plants to recover (Moffat and McPhillips 1993).

H. Birds

Two hundred and thirty-nine species of birds have been observed on the Refuge. Spring and fall migrations find spectacular numbers of waterfowl and other migratory species passing through and staging on Complex lands. Numbers of upland birds are cyclic but populations are present throughout the Complex. (Appendix E).

Effect of Fire on Birds: Research conducted at Arrowwood Complex from 1969-1971 found a greater variety of nesting bird species on burned areas. Duck and sharptailed grouse production was higher on burned areas, hatching success of ducks was higher on burned areas, and there was a marked increase in plant variety after burning (Kirsch and Kruse 1972). Another study conducted on Arrowwood Complex concluded duck nesting success was significantly greater in fall burned plots than in spring burned plots for all species (duck) and years combined. Results suggested that vegetation structure and duck nesting response to spring and fall burns became similar after the third post fire growing season (Higgins 1986).

I. Insects

Insect life and range of occurrence of insects are not well documented at Audubon Complex.

Effect of Fire on Insects: Fire causes an immediate decrease in insect populations (except ants, other underground species, and flying insects), followed by a gradual increase in numbers as the vegetation recovers. The insects eventually reach a population level higher than adjacent areas, then decline to near present levels as vegetation and soil litter stabilize (Higgins, Kruse, and Piehl 1986).

J. Cultural Resources

Most of the Complex has been surveyed for archaeological resources. The regional archaeologist in consultation with the North Dakota State Historical Preservation Office is consulted in the planning stages of all proposed projects. Significant resources have been identified at Lake Ilo NWR and on the Laschkewitsch WPA. There is a high probability that other undetected archaeological or cultural resources exist due to large acreage of native prairie.

Archaeological and historical sites for Audubon Refuge have been inventoried and delineated on maps. This information can be found in the Refuge files. A series of archaeological site specific progress reports have been completed from 1992-1994 for Lake Ilo NWR. A final archaeological report is pending for Lake Ilo NWR. See refuge files for further information.

Effects of Fire on Cultural Resources: Heat from grassland fires rarely penetrates more than a centimeter into the soil. Impacts of grassland fires on artifacts and other materials in subsurface settings will be negligible even if they are buried only a centimeter or less below the ground surface (Wright and Bailey, Vogl). Research conducted by Sayler, Seablom, and Ahler at Knife River Indian Villages National Historic Site in North Dakota indicated that fire related impacts to surface exposed artifacts will be significant, depending on fire conditions and artifact type and size. Damage includes scorching, fracturing, charring, and spalling. Secondary impacts are created by erosion and vandalism. The severity of fire related effects can be controlled and diminished to some degree by controlling the fireline intensity at the time of the burn.

Files and records of cultural resources and the Regional Archeologist should be consulted by the fire management team when planning prescribed burns and preparedness activities. The potential for adverse impacts to cultural resources will be evaluated prior to prescribed burning and in the selection of fire suppression strategies during wildfires.

K. Improvements

The Complex has office/maintenance/residence/visitor service facilities at Audubon NWR and Lake Ilo NWR (total value \$2.7 million). Other improvements include 225 miles of fence valued at approximately \$900,000. Five predator fences within the Complex protect critical waterfowl nesting areas (approximate value of fence \$110,000).

L. Wilderness

There are no designated wilderness areas located within Audubon Complex.

M. Air Quality/Smoke Management

Complex fire activities must comply with all applicable Federal, State, and local air pollution control requirements as specified by Section 118 of the Clean Air Act, as amended 1990.

The North Dakota State Department of Health, Environmental Health Section implements the requirements of the Clean Air Act. Permits to open burn are

required under the authority of the North Dakota Air Pollution Control Rules (Article 33-15, North Dakota Administrative Code). Written requests are submitted by the Complex to the Department of Environmental Health for each planned prescribed burn. Requests must identify acres, location, and purpose of the burn. The State grants approval in letter form and also notifies local and district Environmental Health Practitioners. See Refuge files for State of North Dakota Conditions/Restrictions Applicable to an Approval to Open Burn.

Smoke complaints are investigated by the State Department of Environmental Health. To date, the State has received no complaints concerning smoke from Audubon Complex prescribed fires or wildfires.

N. Water Resources

Wetlands in Audubon Complex are extremely productive and very attractive to migratory waterfowl and resident wildlife. They serve as breeding and nesting areas for many migratory birds and as wintering habitat for many species of resident wildlife. Approximately 23,000 acres of wetlands exist in the Complex, half of which are potentially burnable at one time or another. Many of the prescribed burns conducted in the Complex are adjacent to water resources. Cattail reduction burns may take place over water or ice under the right conditions.

Effects of Fire on Water Resources: Post fire erosion and wind born ash deposition impacting water resources is not a concern for the type and scale of burns conducted on the Complex. Burn size is generally small (average 150 acres) and grass fuels do not produce heavy volumes of ash as compared to forest fuels. Supporting documentation regarding fire effects on water resources can be found in Effects of Fire on Water: A State of the Knowledge Review (1979).

O. Socio-Political-Economic Concerns

Land adjacent to the Complex is almost exclusively privately owned. Values at risk include; scattered privately owned farm houses, barns outbuildings, farm equipment, fences, livestock, and pasture/hay/croplands. Adjacent landowners generally have a low tolerance for wildfire. The use of prescribed fire, however, is generally accepted as a habitat management tool throughout the Complex.

Wildland fuels on adjacent privately held lands are a combination of NFFL Fuel Model 1 (short grass) and NFFL Fuel Model 3 (Grasses over 3 feet). Fuel Model 1 reflects adjacent private grazed pasture and haylands. Fuel Model 3 best describes adjacent private lands enrolled in the Conservation Reserve Program (CRP).

Effects of Fire on the Community: The Service owns and/or manages over 100

different land management unit that are scattered over much of west central North Dakota. Rapid rates of spread common in most of the grass dominated units, combined with the potentially long response times, pose problems for wildfire suppression forces responding to wildland fires on Service lands or adjacent private lands. The Complex's dispersed WPAs and WDAs create many situations where escaped prescribed fires or wildfires could damage adjacent private structures, equipment, and grazing/hay/cropland. Wildfire damage to non-Service public property can occur to wooden utility poles and utility junction boxes on or adjacent to FWS lands. Damage to private property could effect support for the Complex's fire management program.

P. Fuels

1. Fuel Types

Table 2 Fuel Models

Fuel Model	Acres
NFDRS L - NFFL Model 1 - Short Grass	23,560
NFDRS N - NFFL Model 3 - Tall Grass	7,539
NFDRS E - NFFL Model 9 - Hardwood Litter	315
Total Burnable Acres	31,414

- a. **NFDRS Fuel Model L/NFFL Fuel Model 1 (western grasslands):** Approximately 23,560 acres of the total burnable acres (31,414) fit fuel model L. Perennial grasses are the primary fuel, loadings are heavier than model A (annual grasses), and the fuel quantity is more stable from year to year. Decomposition rates of grass fuels are slow which leads to heavier than natural fuel loadings. Invading woody plants may comprise up to 50% of the fuel load on some units. Fuel model L also fits some of the private lands adjacent to Complex lands, particularly grazed pastures and hayland.

- b. **NFDRS Fuel Model N/ NFFL Fuel Model 3 (tall grass):** Approximately 7,539 acres of the Complex fit fuel model N. Described as tall grass, perennial grasses, and or marshland grasses approximately 3 feet tall, one third of the aerial portion of the plant is usually dead. Invading woody plants are mixed with these fuels, some areas as high as 40%. This fuel model fits adjacent private land enrolled in the Conservation Reserve Program (CRP). CRP is a major concern for fire suppression agencies in this area.
- c. **NFDRS Fuel Model E/NFFL Fuel Model 9 (hardwood leaf litter):** Approximately 315 acres of the Complex fit this fuel model. Riparian woodlands, wooded draws, and planted shelter belts are included in this model.

2. Fire Behavior

- a. **Fire Behavior Model 1 (shortgrass):** Fire spread is governed by the fine, very porous and continuous fuels that have cured or are nearly cured. Fires are surface fires that move rapidly through cured vegetation. Fuel loading consists of fine dead fuels only, but average 1.5 - 2 tons per acre.

Fire behavior is directly related to the fine fuel moisture and windspeed. Spread rates with moderate to high windspeeds can reach 255 chains per hour, with flame lengths exceeding seven feet. Spot fires are generally not produced because fuels are consumed too quickly and thoroughly. Fire fronts tend to become irregular as topography, fuel loads, winds, and/or natural barriers speed up or slow movements. Resistance to control is low to moderate, depending on windspeed.

- b. **Fire Behavior Model 3 (tallgrass):** This model displays high rates of spread under the influence of wind. Wind may drive fire into the upper heights of the grass and across standing water. Fuel loading consists of fine and coarse dead fuels, averaging 3 tons per acre. Spread rates with moderate to high windspeeds can reach 200 chains per hour, with flame lengths exceeding 20 feet. Short range spotting (up to 500 feet) is common. Resistance to control is very high to extreme.
- c. **Fire Behavior Model 9 (hardwood litter):** This model displays moderate to low fire intensity. Fires are carried by dead, loosely compacted leaves. Concentrations of dead downed woody material will contribute to more intense burning as well as

moderate spotting. Fuel loads consist of leaves, needles, and small stems and branches, 3.5 tons per acre. Spread rates are generally slow, 7.5 chains per hour. Flame lengths average 2-3 feet. Resistance to control is low except during drought conditions.

2. **Fuel Status**

Fuel loadings in stands of Cattails, DNC and on CRP lands (Model 3) are much heavier than normal. Less robust tame grass plots can have heavier than normal loadings as well. Loading depends on the frequency of fire or the effects of other management actions on an area. See Section X D for additional information.

Q. Historical Fire Information

Audubon Complex is located within the mixed grass prairie ecosystem. Wildfire is one of the primary natural forces which created native prairie. Historic records describe huge prairie fires started by lightning or humans. Fires burned millions of acres as there were few natural firebreaks and no suppression. Higgins (1986) believed that fire frequency in the prairie grasslands is on the order of 5-10 years. Other studies indicate that a longer frequency of 10-20 years may be more accurate. Very little local data exists for Audubon Complex. Between 1941 and 1981, research indicates lightning-caused fires occurred as frequently as once every 12 years on 9,603 acres of privately owned pasture in the Missouri Coteau of Stutsman county (Higgins 1984).

The frequency of wildfire had been greatly diminished by the time Audubon Refuge was established in 1956. Increased agricultural activity and fragmented prairie greatly suppressed the occurrence of wildfire. Remaining grasslands within Audubon Complex were generally grazed or hayed, denying the essential process fire provides the prairie. Managers now accept the fact that fire plays a unique ecological role which has no substitute in the management of grasslands. Fire is recognized as an essential natural process, an inherent part of the prairie ecosystem.

Fire records for the Complex exist from 1982 to present, records prior to 1982 were not located. Audubon Complex has an average of one wildfire per year; a total of 14 wildfires were recorded from 1984-1997. Human caused ignitions account for most of the recorded fires. Equipment and agricultural field burning account for the majority of human-caused wildfires. The agricultural field burning season occurs during spring and fall, and is widespread throughout the Complex. Private landowners are not subject to the same burning regulations as government agencies. Farm fields are often ignited and left unattended, sometimes resulting in wildfires.

The most significant wildfire to date occurred in April 1990, was of unknown

human cause, and burned 640 acres of public land. All fires on record were controlled during the first burning period. Many of the wildfires were suppressed with the help of volunteer fire departments or solely by volunteer fire departments. (For more information, see Appendix F - Complex Fire History.

Table 3: Wildfire Fire Statistics

Average number of fires 1984 - 1997	1
Ten Year Average 1988 - 1997	.1
Wildfire Season	4/1- 6/9 and 8/9 - 10/7

III. FIRE MANAGEMENT PROGRAM AND RESPONSIBILITIES

A. Normal Unit Strength

A listing of equipment and supplies necessary to carry out the fire management program can be found in Appendix G.

B. Personnel

Position needs of the Fire Management program for **both** preparedness and prescribed fire for the Complex are found in Tables 4 and 5. A listing of current employee qualifications is contained in Appendix H

Table 4: Fire Management Needs - Audubon NWR

Position	Minimum Number Required
Incident Commander (ICT5)	1
Prescribed Burn Boss (RXB3)	2
Engine Boss (ENGB)	2
Engine Operators (ENOP)	2
Firefighter (FFT2)	3

Table 5: Fire Management Needs - Lake Ilo NWR:

Position	Minimum Number Required
Incident Commander (ICT5)	1
Prescribed Burn Boss (RXB3)	1
Engine Operator (ENOP)	1
Firefighter (FFT2)	1

1. Staff Responsibilities

Principal members of the Complex fire management organization are the Project Leader, Assistant Refuge Managers and Complex Biologist. Additional staff and volunteers augment the fire management team.

Only qualified employees meeting the fitness and training requirements of assigned positions will be dispatched to fires. Employees not meeting requirements may assist in support capacities, but will not be permitted on the fireline. The FWS Fire Management Handbook and Regional Policy Directives can be referred to for specific policy guidance.

a. Project Leader

Responsible for the overall management of the Complex, including the fire program.

Insures that Department, Service, and Refuge policies are followed and maintained.

Insures sufficient collateral duty firefighters meeting Service standards are available for initial attack.

Serves on the fire management team, as available and qualified.

Approves prescribed fire plans.

b. AWMD Manager

Responsible for the management of the District, including the fire program.

Insure that Department, Service, and Refuge policies are

followed and maintained.

Insure sufficient collateral duty firefighters meeting Service standards are available for initial attack.

During the absence of the Project Leader, delegated the responsibility for managing the wildland and prescribed fire programs.

Prepares annual FIREBASE budget requests, approves and tracks use of FIREBASE accounts.

Responsible for planning, coordinating and directing preparedness activities including:

- a. Fire Training
- c. Physical testing and Interagency Fire Qualification System (IFQS) data entry.
- d. Fire cache and equipment inventory accountability, maintenance, and operation.
- e. Cooperation with cooperative agencies. Revises cooperative agreements as necessary.
- f. Insures Step-Up plan is followed.

Updates the Fire Management Plan, maintains fire records, reviews fire reports (DI-1202) for accuracy.

Serves on the fire management team, as available and qualified.

Supervises the writing of prescribed burn plans for the District.

3. **Ilo NWR Manager**

Responsible for the management of the Refuge, including the fire program.

Insure that Department, Service, and Refuge policies are followed and maintained.

Insure sufficient collateral duty firefighters meeting Service standards are available for initial attack.

Maintains Ilo Fire Cache and equipment inventory accountability, maintenance, and operation.

resource needs and situation updates, including the need for extended attack.

Utilize minimum impact strategies whenever possible.

Ensure that fire behavior is monitored, data collected and recorded and that firefighters are briefed on current and predicted weather and fire behavior, radio frequencies to be used and safety routes and safety zones. Posts lookouts.

Identify and protect sensitive areas.

Submit completed DI-1202, crew time sheets, and a listing of any other fire related expenditures or losses to the AWMD Manager within 10 days of the fire being declared out.

7. Prescribed Burn Boss (as assigned)

Implement approved prescribed burn plans within prescriptions.

Assist with the administration, monitoring, and evaluation of prescribed burns.

Ensure that fire behavior is monitored, data collected and recorded.

Submit completed DI-1202, crew time sheets, and a listing of any other fire related expenditures or losses to the AWMD Manager within 10 days of the fire being declared out.

8. Fire Cooperators

Provide assistance in suppression of wildfires as defined in cooperative agreements and Memorandums of Understanding.

Assist as needed in the investigation of fires of suspicious origin.

IV. POLICY COMPLIANCE

A. Compliance With Service Policy

U.S. Fish and Wildlife Service policy requires that an approved Fire Management

Plan must be in place for all of Service lands with burnable vegetation. Service Fire Management Plans must be consistent with firefighter and public safety, protection values, and land, natural, and cultural resource management plans, and must address public health issues. Fire Management Plans must also address all potential wildland fire occurrences and may include the full range of appropriate management responses. The responsible agency administrator must coordinate, review, and approve Fire Management Plans to ensure consistency with approved land management plans.

Service policy allows for a wildland fire management program that offers a full range of activities and functions necessary for planning, preparedness, emergency suppression operations, emergency rehabilitation, and prescribed fire operations, including non-activity fuels management to reduce risks to public safety and to restore and sustain ecosystem health. This plan meets that requirement and provides wildland fire management guidance to the Audubon Complex..

B. NEPA Compliance and Authorities Citations

This plan meets the requirements of the National Environmental Protection Act (NEPA). An environmental Assessment (EA) discussing the use to fire to manage the refuge (Habitat Management Plan) was completed in 1983. The use of prescribed fire was adequately addressed the Environmental Assessment of the Upland Management plan (1994) (Attachment 1). A Section 7 consultation was sought and received concerning the adverse effects of selected management actions, including prescribed fire (April 25, 1994) (Appendix D). A determination was made that no adverse impacts would occur.

A new EA will not be completed for prescribed fire due to new regulations published in the Federal Register (62 FR 2375) January 16, 1997. The new regulation categorically excludes prescribed fire when used for habitat improvement purposes when conducted in accordance with local and State ordinances and laws. Wildfire suppression and prescribed fire are both categorically excluded, as outlined in 516 DM 2 Appendix 1. The Complex will circulate drafts of this plan to its cooperators and other interested parties for review and comment.

The statutes cited herein authorize and provide the means for prevention, preparedness, control, and suppression of wildfire on lands under the jurisdiction of the Department of the Interior, or lands adjacent thereto.

1. Protection Act of September 20, 1922 (42 Stat.857;16 U.S.C. 594).
2. Economy Act of June 30, 1932.

3. Federal Property and Administrative Services Act of 1949 (40U.S.C. 471 et seq.).
4. Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66, 67; 42 U.S.C. 1856, 1856a) Authorizes reciprocal fire protection agreements with any fire organization for mutual aid with or without reimbursement and allows for emergency assistance in the vicinity of agency facilities in extinguishing fires when no agreement exists.
5. National Wildlife Refuge System Administrative Act of 1966 as amended (80 Stat. 927; 16 U.S.C. 668dd-668ee).
6. Disaster Relief Act of May 22, 1974 (88 Stat. 143; 42 U.S.C.5121).
7. Federal Fire Prevention and Control Act of October 29, 1974 (88 Stat. 1535; 15 U.S.C. 2201).
8. Federal Grants and Cooperative Act of 1977 (Pub. L. 95-244, as amended by Pub. L. 97-258, September 13, 1982. 96 Stat. 1003 31 U.S.C. 6301-6308).
9. Wildfire Assistance Act of 1989, (Pub. L. 100-428, as amended by Pub. L. 101-11, April, 1989).
10. Departmental Manual, Part 620, Wildfire Suppression and Management (December 25,1998).
11. United States Fish and Wildlife Service Wildland Fire Management Handbook (1998).
12. United States Fish and Wildlife Service Refuge Manual, Chapter 6 RM 7, Fire Management (September 6, 1991).

C. **Other Regulatory Concerns**

Fire management activities within the Complex will be implemented in accordance with the regulations and directions governing the protection of cultural resources as outlined in **Departmental Manual Part 519 (519M), Code of Federal Regulations (36 CFR 800)**, the **Archaeological Resources Protection Act of 1979**, and the **Archaeology and Historic Preservation Act of 1974. National Historic Preservation Act of 1966 Section 106** clearance will be followed for any fire management activity that may affect historic structures or

archaeological resources. **Endangered Species Act** of 1973, as amended, dictates that managers will take appropriate action to identify and protect from adverse effects any rare, threatened, or endangered species located within the Complex. US Fish and Wildlife Service policy requires that State threatened and endangered species and Federal candidate species will be incorporated into any planning activities.

D. Enabling Legislation and Purpose for the Complex

1. Audubon NWR:

Public Law 732 established authority for a General Plan and Cooperative Agreement between the Department of Army and Department of Interior whereby the southern portion of Snake Creek Reservoir became Snake Creek NWR (now Audubon NWR). The Refuge was established in 1956 as a wildlife mitigation area for the Corps of Engineers Garrison Dam and Reservoir Project. Audubon Refuge is managed under the National Migratory Bird Management Program with primary emphasis on waterfowl production and maintenance.

2. Lake Nettie and McLean NWR's:

Fee portions acquired under the Migratory Bird Conservation Act, as amended, for "use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 717d (Migratory Bird Conservation Act).

3. Lake Ilo NWR

16 U.S.C. 460 k-1 (Refuge Recreation Act) which states that land may be acquired under the Refuge Recreation Act, as amended, for one or more of the following purposes:

- (1) Incidental fish and wildlife oriented recreational development,
- (2) The protection of natural resources,
- (3) The conservation of endangered species or threatened species..."

4. White Lake NWR

16 U.S.C. 715d (Migratory Bird Conservation Act, as amended) which states that lands may be acquired "for use as an inviolate sanctuary, or for

other management purposes, for migratory birds.”

5. Stewart Lake NWR

16 U.S.C. 4601-4-460-11 (Land and Water Conservation Fund act of 1965, as amended). 16 U.S.C. 460 k-1 (Refuge Recreation Act, as amended) which states that land may be acquired under the Refuge Recreation Act for one or more of the following purposes:

- (1) Incidental fish and wildlife oriented recreational development,
- (2) The protection of natural resources,
- (3) The conservation of endangered species or threatened species...”

6. Waterfowl Production Areas (WPA)

WPA acquisition started in the 1960's and continues under three authorities: 1) 16 U.S.C. 717d (Migratory Bird Conservation Act), by transfer under the Consolidated Farm and Rural Development Act (7 U.S.C. 2002, c), and 3) by acquisition under the Migratory Bird Hunting and Conservation Stamp, as amended (16 U.S.C. 718 [c]) for one or more of the following purposes:

- (1) Incidental fish and wildlife oriented recreational development,
- (2) The protection of natural resources,
- (3) The conservation of endangered species or threatened species
- (4) As Waterfowl Project Areas subject to all provisions of the Migratory Bird Conservation Act except the inviolate sanctuary provisions, as mandated.

7. Wildlife Development Areas (WDA)

WDA acquisition was by the U.S. Bureau of Reclamation (Bureau) for the Garrison Diversion Unit Irrigation Project (GDU). In 1986, the Garrison Diversion Reformulation Act was passed, authorizing the current project. The WDA's were developed by the Bureau to mitigate wildlife habitat losses resulting from the GDU. WDA's are managed similarly to WPA's.

Specific purposes for each WDA are set in Specific Management Plans. The areas are to be used for one or more of the following purposes:

- (1) Production and maintenance of migratory birds, particularly waterfowl.
- (2) Provide habitat for a variety of nonmigratory birds, mammals, and other wildlife.

E. Complex Planning Documents

1. Goals and Objectives Statement - Audubon NWR (1991) (Appendix A)

a. Mission Statement

“To protect and manage wildlife habitat, in cooperation with other Federal and State agencies, private and public landowners and others in sufficient quantity and in a way that will maintain historic numbers and distribution of migratory birds and other wildlife.”

b. Goals and Objectives

Goal I: Waterfowl Production and Maintenance - Provide the life requirements of waterfowl occurring on and adjacent to the refuge.

Objective: The objective for this goal sets specific production numbers.

Goal II: Other Migratory Birds - Provide the life requirements of other migratory birds occurring on and adjacent to the Refuge.

Objective: The objective for this goal sets specific production numbers.

Goal III: Endangered and Threatened Species - Preserve, restore and enhance federally listed endangered and threatened species numbers and habitats

Objective: The objective for this goal sets specific production numbers.

Goal IV: Resident Fish and Wildlife - Preserve, restore and enhance habitat for maximum numbers and diversity of resident wildlife and fish species.

Objective: Raise as many of these species as possible.

Goal V: Public Use, Information and Education - Provide a range of enjoyment and learning opportunities for the public to the maximum degree possible.

Objective: If funding and staff are provided, implement the 1991 Refuge Public Use Plan as approved by the RO.

Goal VI: - Cultural Resources - Protect all known cultural and historic resources.

Objective: Continue to request the Corps of Engineers provide the archeological and cultural information generated by their contracted review of the Refuge (1989).

Goal VII: Environmental Quality - Preserve and enhance the overall environmental quality, wild character and natural beauty of the Refuge.

Objective: *Continue improving the native prairie ecosystem via prescribed burning and grazing.*

Goal VII: Organizational Vitality - Develop and maintain a well trained and highly motivated work force.

Objective: Recruit, train, retain and promote highly qualified individuals of all cultural backgrounds. Take all steps needed to operate safely, healthy and with respect for all individuals.

2. Habitat Management Plan - Audubon Complex (1983)

“The primary (goals) of the Refuge Complex are the production of migratory waterfowl and maintenance and enhancement of migration habitat for ducks and geese. Secondary (goals) include production of migratory non-game birds, protection and enhancement of non-migratory

wildlife species, environmental education, and the protection and enhancement of natural ecological communities. Habitat management is a critical function necessary to meet these (goals).”

This document recognized the use of prescribed fire as an important management tool.

3. **EA - Upland Management Plan - Audubon Complex (1994) - Attachment 1**

The purpose of the document is to evaluate the alternative actions for managing upland habitat to achieve long term management objectives. Researchers have found that in order to provide high-quality habitat, upland vegetation must be in a healthy and vigorous state. Grasses and grassland-allocated forbs require periodic disturbance and partial or total defoliation events in order to maintain a healthy and vigorous condition. The use of prescribed fire is recognized an important resource management tool.

4. **Complex Safety Plan**

The Complex Safety Plan objectives are:

- # Provide safe working conditions for all employees
- # Provide safe environment for employees and the public
- # Protect and insure the safety of government equipment and facilities.
- # Identify and define available safety equipment and its location.
- # Assign responsibilities for various aspects of the Station Safety Program.
- # Identify sources of emergency assistance.
- # Provide documentation.
- # Provide a climate of safety first in all aspects of Refuge operations.

F. **Fire Use Strategies**

1. Use prescribed fire to manipulate vegetation and enhance the biological productivity and diversity of specific organisms or to accomplish specific objectives, e.g.: prairie restoration and maintenance, manage for a specie of special concern. Reduce vegetative litter, control noxious weeds, improve height and density of plant cover.
2. Aggressively suppress wildfires occurring in sensitive areas.

3. Establish long-term monitoring transects or plots in all major upland habitat types to detect changes in cover and major species composition.
4. Prescribed fire may be used to reduce hazardous fuel accumulations, provided resource management objectives are also being met and the use of fire for this purpose is cost-effective.
5. Utilize the appropriate fire management response concept.

Table 6: Appropriate Management Response

SITUATION	STRATEGY	TACTIC
1. Wildland fire on Refuge lands which does not threaten life, natural or cultural resources or property values.	Restrict the fire within defined boundaries established either prior to the fire or during the fire.	1. Holding at natural and man-made barriers. 2. Burning out. 3. Observe and patrol.
1. Wildland fire on Service property with low values to be protected. 2. Wildfire burning on to Service lands. 3. Escaped prescribed fire entering another unit to be burned.	Take suppression action, as needed, which can reasonably be expected to check the spread of the fire under prevailing conditions.	1. Direct and indirect line construction. 2. Use of natural and man-made barriers. 3. Burning out 4. Patrol and mop-up of fire perimeter.
1. Wildland fire that threaten life, property or sensitive resources. 2. Wildland fire on Service property with high values to be protected. 3. Observed and/or forecasted extreme fire behavior.	Aggressively suppress the fire using direct or indirect attack methods, holding the fire to the fewest acres burned as possible.	1. Direct and indirect line construction 2. Engine and water use. 3. Aerial retardant 4. Burn out and back fire. 5. Mop-up all or part of the fire area.

FIRE MANAGEMENT OBJECTIVES

The goal of wildland fire management is to plan and make decisions that help accomplish the mission of the National Wildlife Refuge System. That mission is to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. Fire management objectives (standards) are used in the planning process to guide management to determine what fire management responses and activities are necessary to achieve land management goals and objectives.

The primary goal is to provide for firefighter and public safety, property, and natural resource values. Service policy and the Wildland Fire Policy and Program Review direct an agency administrator to use the appropriate management response concept when selecting specific actions to implement protection and fire use objectives. The resulting Appropriate Management Response are specific actions taken in response to a wildland

fire to implement protection and fire use objectives. With an approved Fire Management Plan, the Refuge staff may use wildland fire in accordance with local and State ordinances and laws to achieve resource management objectives (habitat improvement).

At present, the Complex does not have a Master or Comprehensive Plan. Various operational plans for the Complex include objectives which pertain to fire management. A thorough discussion of the Complex's goals and objectives, hazard fuel management concerns, and how fire will be used to achieve desired results can be found in the previous section. Fire specific goals and objectives are indicated below.

A. Complex Fire Management Goals

1. Firefighter and public safety is the priority objective of the program. All Fire Management activities will reflect this commitment.
2. Protect life, property, and other resources from wildfire.
3. Use prescribed fire when and where appropriate as a tool to accomplish Complex habitat management objectives.
4. Restore fire into the ecological process.
5. Develop and implement a process to ensure the collection, analysis, and application of fire management information needed to make management decisions

B. Complex Fire Management Objectives

1. Safely suppress all wildfires using strategies and tactics appropriate to safety considerations and values at risk.
2. Protect from fire all important scientific, cultural, historic, prehistoric, visitor facilities, administrative sites, and refuge housing.
3. Use prescribed fire to the fullest extent possible within or near Complex developments to reduce the risk of wildfire damage and minimize the impact and cost of fire suppression by treating 500 acres annually.
4. Educate the public regarding the role of prescribed fire within the Complex.
5. Use prescribed fire to restore and perpetuate native wildlife species, by maintaining a diversity of plant communities. Treat 2,000 acres annually.
6. Prevent human-caused wildfires
7. Maintain and enhance grasslands by retarding the invasion of wood species and noxious weeds by treating 2,000 acres annually.

VI. FIRE MANAGEMENT STRATEGIES

A. Strategies to Meet Fire Management Objectives

1. The Complex will utilize the **appropriate management response** to suppress all wildland fire including lightning ignitions occurring on Service lands.
2. Suppress all wildfires in a safe and cost effective manner consistent with resources and values at risk.
3. Suppression strategies and tactics will be unique to each incident dependent on safety considerations, weather conditions, costs of suppression, fuel conditions, availability of resources and location of the fire.
4. Minimum impact strategies and tactics will be used whenever possible.

5. Prescribed fire will be utilized to modify vegetative communities for improved wildlife habitat, ecosystem function, noxious weed control, and hazard fuel reduction
6. Conduct all fire management programs in a manner consistent with applicable laws, policies and regulations.

B. Limits to Strategies

1. **Wildland fire use for resource benefit will not be** considered when selecting the appropriate management response.
2. Limit disturbance to the soil by minimizing mechanical fire breaks to control wildfires and in preparations of prescribed burns.
3. To the greatest extent possible, hazard fuel prescribed fires will be used only when they can compliment resource management objectives.
4. Prescribed burning in areas where threatened, endangered, and candidate species exist will be conducted such that small to medium size burns (10-300 acres) can increase local habitat diversity by creating a mosaic of habitats and increased habitat interspersed and edge.
5. Heavy equipment (dozers, discs, plows, and graders) will not be used for fire suppression except in life threatening situations without the express approval of the Complex Project Leader.
6. The use of prescribed fire to achieve management objectives must be conducted in a cost effective manner.
7. Aerial Retardants and foams will not be used within 300 feet of any waterway as described in the Guidelines for Aerial Delivery of Retardant or Foam near Waterways.

VII. FIRE MANAGEMENT UNITS - SUPPRESSION

The Complex will be broken into three (3) Fire Management Units for both Prescribed Fire and Wildfire Suppression. The three units are Audubon NWR, Ilo NWR, and Satellite Areas. The Prescribed Fire Management Units will be discussed in Section VIII - Fire Management Units - Prescribed Fire Program. The Complex was divided into the three units for the following reasons:

- # There is adequate staffing and resources at Audubon NWR to take initial action on wildland fires occurring on the Refuge and can handle most wildland fires relying on the resources at hand.
- # There is limited staffing and equipment at Ilo NWR and they are separated from the headquarters at Audubon NWR. As a result, they can not rely on staffing at Audubon and must take action on any wildfires occurring on the Refuge. It may be necessary to rely on local volunteer fire departments for assistance.
- # The Satellite Unit is composed of far flung Service lands which are intermingled with private lands. It is expected that all most all the reported wildfires will be suppressed by local volunteer fire departments.

Figure 2 Fire Management Unit Map

A. FMU Suppression Objectives

With the exception of VII B 1 which applies to the Satellite Unit, Suppression Objectives and Strategies are the same for all three units.

1. Provide for firefighter safety and safety of Refuge visitors, cooperators, and other personnel.
2. The Refuge will utilize the appropriate management response to suppress all wildland fire including lightning ignitions occurring within the boundaries of the Refuge.
3. Minimize the damage to Refuge resources from suppression efforts.
4. Prevent the fire from burning off of the Refuge onto adjacent lands
5. Prevent damage to cultural resources, improvements, and species at risk.

B. Suppression Strategies and Tactics

1. Due to the wide-spread land holdings of the Complex, local fire agencies (volunteer fire departments) will be utilized for initial attack on wildfires in remote areas of the Complex.
2. Utilize existing roads and trails, bodies of water, area of sparse or non-continuous fuels as primary control lines, anchor points, escape routes, and safety zones.
3. When appropriate, conduct backfiring operations from existing roads and natural barriers to halt the spread of fire.
4. Use burnouts to stabilize and strengthen the primary control lines.
5. Complex initial attack equipment and personnel will be distributed and maintain to respond in a timely manner during the fire season.
7. The Incident Commander will choose the appropriate suppression strategy and technique.

C. Limits

1. The use of heavy equipment must be approved by the Project Leader or his designee.
2. Section VI - B lists other limits.

D. Special Conditions and Concerns

1. Rapid rates of spread, potentially long response times, and large number of individual land units (WPAs, WDAs and satellite Refuges) pose suppression problems and increase the likelihood of escape onto adjacent lands.
2. Isolation of many units from Service staffed equipment will reduce response times.

E. Normal (Expected) Fire Behavior

Fire behavior is dependent on many factors. Some of the most important influences are Relative Humidity, air temperature, fuel type, fuel moisture, windspeed, slope, aspect, time of day, and season. On site predictions of estimated fire behavior can be made with the above inputs through the use of nomograms and other prediction models developed for the purpose. The various prediction systems provide outputs of Rate of Spread, Fireline Intensity, Heat Per Unit Area, and Flame Length.

General statements can be made for fires in certain fuel types. A summary can be found in Section II P - Fuels.

F. Use of ERC and BI to Predict Fire Behavior

At the present time the Complex does not have a weather station, therefore the necessary data has not been collected to accurately determine a fire weather history. Until such time as the refuge purchases and installs a weather station and catalogues site specific data in WIMS, the station at J. Clark Salyer NWR will be used to determine potential fire behavior and trends necessary to properly manage the fire suppression program.

G. Relationship of Fire Management Unit to Resource Management Objectives

The previous discussion of Station Objectives fully addresses the unit objectives for the Suppression Unit.

VIII. FIRE MANAGEMENT UNITS - PRESCRIBED FIRE

The Complex will be broken into three (3) Fire Management Units for both Prescribed Fire and Wildfire Suppression. The three units are Audubon NWR, Ilo NWR, and Satellite Areas. The Wildfire Suppression Units were discussed in Section VII - Fire Management Units - Suppression. The Prescribed Fire Units were designated for the following reasons:

- # The location of firefighters, qualified individuals (Burn Bosses), equipment, and other resources.
- # Remoteness from Headquarters with all the logistical requirements associated with isolated burn units (e.g.: planning, preparation, execution).
- # All three units require additional resources to carry out the burns, however, there are employees on site at Audubon and Ilo NWR's to perform some, if not all the on-site planning and preparation. The fragmented nature of the Satellite Unit requires careful planning and scheduling.

A. Prescribed Fire Objectives

1. Restoration/perpetuation of native grass and forb species.
2. Achieve hazard fuel and resource management objectives.
3. Periodic reduction of dense cattail growth in wetland units.
4. Maintain/rejuvenate nesting cover for waterfowl and other native birds.
5. Reduction and control of non-native grass species and noxious weeds.
6. Control of woody species invasion of grasslands

7. Site preparation for farming and seeding projects.
8. Use in combination with other management tools to achieve desired results.

B. Limits

1. Foams or Aerial Retardants will not be used within 300 feet of a waterway
2. Prescribed burns will not be conducted when the Keetch-Byram Drought Index exceeds 600 or the Palmer Drought Index indicates “extreme drought” (Greater than -4).
3. The use of earth moving equipment for line building activities on the Complex will not be permitted without the approval of the Project Leader.
4. The Complex will not ignite prescribed fires when adjacent counties or the State of North Dakota has instituted a burning ban.
5. Multiple burns will not be conducted when adequate staffing is not available to adequately respond to and escape.
6. All actions taken will be in accordance with Service Policy.
7. Additional limits may be identified in individual burn plans.

C. Fuel Types and Expected Fire Behavior

Fire behavior is dependent on many factors. Some of the most important influences are relative humidity, air temperature, fuel type, fuel moisture, windspeed, slope, aspect, time of day, and season. On site predictions of estimated fire behavior can be made with the above inputs and provide outputs of rate of spread, fireline intensity, heat per unit area, and flame length through the use of nomagrams developed for this purpose.

General statements can be made for fires in certain fuel types.

Fuel Model 1 Grass - describes areas dominated by short grass, such as saltgrass. Rate of spread of 78 chains/hour with flame lengths of 4 feet are possible under moderate conditions. This fuel model occurs on upland sites.

Fuel Model 3 Grass - describes areas dominated by grass or grasslike vegetation averaging 3 feet in height. This would include cured stands of cattail and patches of DNC. Rate of spread of 104 chains/hour with flame lengths of 12 feet are possible under moderate conditions. This fuel model occurs around developed wetlands and some naturally occurring wetlands.

Fuel Model 9 Hardwood litter - describes areas where loosely compacted leaf litter is the primary carrier of the fire. Fires run through the surface litter faster than model 8 and have longer flame height. Fall fires in hardwoods are predictable, but high winds will actually cause higher rates of spread than predicted because of spotting caused by rolling and blowing leaves. Rates of spread are slow, 7.5 chains/hour with flame lengths of 3 feet or less, under normal conditions.

D. Special Concerns

Wildfire can be dangerous and unpredictable during any season of the year, however the early Spring months typically have the potential for the **most severe fire behavior**.

IX. WILDFIRE PROGRAM

A. Introduction

Fourteen wildfires burning a total of 723 acres have been recorded from 1985 to 1997 for the Complex. Records of wildfire activity prior to 1985 could not be located in the Refuge files. Human caused fires through agricultural practices and other sources make up the majority of wildfires that have occurred on the Complex. As outlined in Section II P, the fuels on the refuge fall primarily in the Grass Group and can, under the right conditions, burn with high Rates of Spread and Flame Lengths that make direct attack difficult.

The Wildfire Season is split into two periods: April 1 - June 9th, and August 9 - October 7th. Fluctuation in precipitation and effects of drought can shorten or lengthen the season accordingly. For a breakdown of past fires see Appendix F.

Risk of wildfires or prescribed fires escaping from Audubon National Wildlife Refuge lands is moderate. Farming, grazing and wetlands create barriers to fire spread in some areas. Access for light and medium engines is fair considering slope, wetlands, rocks, and limited access roads or trails. The nature of the topography requires specific knowledge of access routes for fire suppression actions.

Lake Ilo, White Lake, Stewart Lake and Pretty Rock NWRs are mostly surrounded by cropland or intensively grazed rangeland. Risk of wildfires or prescribed fires escaping Refuge lands is moderate. Grazing and farming on adjacent lands create barriers to fire during portions of the year. Access is fair to good for light and medium engines. Intermittent streams and wetlands can pose safety problems of getting stuck amidst fuel concentrations. Access roads and trails are generally available.

B. Special Safety Concerns and Firefighter Safety

Heavy fuel loading and adverse weather conditions can work together to produce conditions that are detrimental to firefighter safety. It is common practice to attack the fire at the head using mechanized equipment. Firefighters must be alert to their surroundings and the weather to insure there is adequate time to access escape routes and safety zone. Intermittent streams and wetlands can pose safety problems of getting stuck amidst fuel concentrations.

Smoke from wildfires and prescribed fires is a recognized health concern for firefighters. Prescribed burn bosses and wildfire incident commanders must plan to minimize exposure to heavy smoke by incorporating the recommendations outlined in the publication Health Hazards of Smoke (Sharkey 1997). The use of respirators is not recommended.

C. Fire Prevention

Human caused fires through agricultural practices and other sources make up the majority of wildfires that have occurred on the Complex. In general, the public and visitors to the Complex are aware of fire prevention. As a reminder the Complex may do the following:

- # Signing
- # Contacts with Complex cooperators and neighbors
- # Public contacts through press releases and verbal contacts
- # Employee training and awareness
- # Closures when necessary
- # Implementation of State regulations and restrictions
- # Enforcement of regulations and prosecution of violators

D. Preparedness

1. Training and Qualifications

Along with other land management agencies, the Service has adopted the National Interagency Incident Management System (NIIMS) Wildland and Prescribed Fire Qualification Subsystem Guide, PMS 310-1 to identify minimum qualification standards for interagency wildland and prescribed fire operations. PMS 310-1 recognizes the ability of cooperating agencies at the local level to jointly define certification and qualification standards

for wildland fire suppression. Under that authority, local wildland fire suppression forces will meet the standards established for their agency or department. All personnel participating in prescribed fire management activities must meet Service fitness and training standards.

a. Training

The Regional Office will pay for all approved fire training if the following criteria are met:

1. Participant completes and submits to the Zone FMO a National Wildfire Coordinating Group Interagency Training Nomination form (NFES 2131), complete with supervisory approval and an estimated cost of training, travel and per diem prior to the commencement of training.
2. The training is approved by the Zone Fire Management Officer. Upper level courses may require concurrence of the Regional Fire Management Coordinator.
3. Upon completion of the training, a copy of the Certificate of Completion will be sent to the Zone FMO and a copy of the travel voucher is sent to the Fire Program Assistant in the Regional Office.

b. Annual Refresher Training

All personnel involved in Fire Management activities are required to participate in 8 hours of fire management refresher training annually in order to be qualified for fire management activities in that calendar year. Refresher training will concentrate on local conditions and factors, the Standard Fire Orders, LCES, 18 Situations, and Common Dominators. NWCG courses Standards for Survival, Lessons Learned, Look Up, Look Down, Look Around, and others meet the firefighter safety requirement; but, efforts will be made to vary the training and use all or portions of other NWCG courses to cover the required topics. Fire **shelter use and deployment** under adverse conditions, if possible, **must** be included as part of the annual refresher.

c. Physical Fitness

All personnel involved in fire management activities will meet the fitness standards established by the Service and Region. At this point in time, firefighters participating in wildfire suppression must

achieve and maintain an **Arduous** rating. Firefighters participating in Prescribed Burns must achieve and maintain a **Moderate** rating. Information found in Appendix I provides specific instructions to administer the tests, a health screening questionnaire to aid in assessing personal health and fitness of employees prior to taking the test, an informed consent form, and safety considerations. A trained and qualified American Red Cross Responder (or equivalent) who can recognize symptoms of physical distress and appropriate first aid procedures must be on site during the test.

Wildland fire fitness tests shall not be administered to anyone who has obvious physical conditions or known heart problems that would place them at risk. All individuals are required to complete a pre-test physical activity readiness questionnaire prior to taking a physical fitness test. They must read and sign the Par-Q health screening questionnaire, an informed consent form (Appendix I). If an employee cannot answer NO to all the questions in the PAR-Q health screening questionnaire, or is over 40 years of age, unaccustomed to vigorous exercise, and testing to achieve a Moderate or Light rating, the test administrator will recommend a physical examination. As noted below, all individuals over 40 years of age **must** receive an annual physical **prior** to physical testing.

d.

Physical Examinations

In keeping with Service Policy, a physical examination is required for all new permanent employees and all seasonal employees assigned to arduous duty as fire fighters prior to reporting for duty. A physical examination may be requested for a permanent employee by the supervisor if there is a question about the ability of an employee to safely complete one of the work capacity tests. All permanent employees over 40 years of age who take the Pack or Field Work Capacity Test to qualify for a wildland or prescribed fire position are required to have an annual physical examination before taking the test. The cost of examination will be born by the Service and the results sent to the Region Personnel Department.

2. Annual Refuge Fire Management Activities

Table 7: Annual Refuge Fire Management Activities

ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12
Update Interagency Fire Agreements/AOP's	x											
Winterize Fire Management Equipment										x		
Inventory Fire Engine and Cache		x										
Complete Training Analysis	x											
Annual Refresher Training				x								
Annual Fitness Testing				x								
Pre-Season Engine Preparation			x									
Weigh Engines to verify GVW Compliance			x									

Prescribed Fire Plan Preparation			x									
Review and Update Fire Management Plan				x								
Prepare Pre-season Risk Analysis			x									

Activities should be completed prior to the end of the month that is indicated.

3. Emergency Preparedness

As indicated previously, periods of drought can greatly impact fire behavior and resistance to suppression. For that reason the North Dakota Rangeland Fire Danger Index, Palmer Drought Index, and the Ketch-Byram Drought Index will be monitored at a minimum on a weekly bases throughout the year. All are available on the Internet at <http://ndc.fws.gov>. The Refuge fire staff can also contact the North Dakota Interagency Dispatch Center (701-768-2552) during periods of high fire danger to track indices and anticipate possible fire activity. Preparedness actions have been identified in the Step-Up Plan to respond to unusual conditions associated with drought and other factors (Appendix I).

Large scale fire suppression activities occurring in various parts of the country can have an impact on local fire management activities. For example, resources may be limited to implement prescribed fire activities because the closest available resources may be assigned to fire suppression duties or Refuge personnel may be involved as well. Regional drought conditions may also tie-up local resources that would normally be able to assist with Refuge fire management activities. It may be necessary to go out of Region to get the resources needed to staff the Refuge engine during periods of extreme drought or high fire danger.

The Refuge is in the Northern Rockies Area. During National and Regional Planning Levels IV and V, it is necessary to receive approval from the Regional Fire Management Officer and the concurrence of the Northern Rockies Area Coordination Group to conduct prescribed burns during PL IV and the National Coordination Group during PL V.

All other preparedness activities will be in accordance with the **Refuge Step-up Plan** (Appendix J).

E. Normal Unit Strength

1. Engines, tools, and other equipment

Engines are the primary initial attack resource on the Refuge because of the predominance of fine fuels and access roads. Earth moving equipment is available, however it will only be used after approval of the Project Leader.

The light engine will be fully prepared year round and stored in the heated fire bay. The water tender will be filled when the possibility for hard freeze is past, usually in April. All other equipment will be stored at the refuge headquarters or at Ilo NWR and may be kept in the equipment storage building during the winter months.

Lists of tools and other equipment can be found in Appendix G.

2. Personnel

A listing of required positions for wildfire management activities can be found in Section III, Tables 4 and 5. Current staffing status can be found in Appendix K.

F. Emergency Presuppression and Severity Funding

Severity funding is different from Emergency Presuppression funding. Emergency Presuppression funds are used to fund activities during short-term weather events and increased human activity that increase the fire danger beyond what is normal. Severity funding is requested to prepare for abnormally extreme fire potential caused by an unusual climate or weather event such as extended drought. Severity funds and emergency presuppression funds may be used to rent or preposition additional initial attack equipment, augment existing fire suppression personnel, and meet other requirement of the Step-up Plan.

Emergency Presuppression and Severity funds will be requested in accordance with the guidance provided in the Service's Fire Management Planning Handbook. As a general guide, Severity funding will be requested if a severe drought is indicated by a Palmer Drought Index reading of -4.0 or less or a Keetch-Byram Drought Index of 600 or greater and a long-range forecast calling for below average precipitation and/or above average temperatures. Drought Indices can be located at: <http://www.boi.noaa.gov/fwweb/fwoutlook.htm>.

G. Detection

The Refuge relies on neighbors, visitors, cooperators, and staff to detect and report fires. In addition, the step-up plan provides for increased patrols by refuge personnel during periods of very high and extreme fire danger.

There may be occasions when unqualified personnel discover a wildland fire. When this occurs, the employee should report the fire and request assistance before taking action to suppress or slow the spread of the fire. If the fire poses an imminent threat to human life, the employee may take appropriate action to protect that life before requesting assistance. The unqualified personnel will be relieved from direct on-line suppression duty or reassigned to non-fireline duty when qualified initial attack forces arrive.

H. Fire Suppression

1. General

Service policy requires the Refuge to utilize the ICS system and firefighters meeting NWCG qualifications for fires occurring on Refuge property. All suppression efforts will be directed towards safeguarding life while protecting the Refuge's resources and property from harm. Mutual aid resources responding from Cooperating Agencies will not be required to meet NWCG standards, but must meet the standards of their Agency. Mutual aid resources will report to the IC (in person or by radio)

and receive their duty assignment. Mutual aid forces will be first priority for release from the fire. If additional firefighters are needed, appropriate procedures will be used to acquire them.

2. Initial Reporting and Dispatching

All fires occurring within or adjacent to (within two miles) Audubon National Wildlife Refuge will be reported to Complex headquarters. **The person receiving the report will be responsible for implementing the Fire Dispatch Plan (Appendix L) and assume duties of Fire Dispatcher until relieved or released.** Fire occurring within or adjacent to Ilo NWR will be reported to the Refuge Headquarters and handled in accordance with the Fire Dispatch Plan, when ever possible. In the event it is not possible, the fire will be reported to the Complex headquarters.

For local fires, the **Fire Dispatcher** will stay on duty until: (1) all Refuge resources return; (2) relieved by another dispatcher; or (3) advised by IC that he/she can leave. The Fire Dispatcher will not be required to stay on duty if the fire occurs outside Refuge radio coverage but the dispatcher must notify the North Dakota Dispatch Center (1-701-768-2552) that a dispatcher is not on duty at the Refuge before leaving.

The **Fire Dispatcher** will be responsible for coordinating the filling and delivery of any resource orders made by the IC for all operational and logistical needs, including engines, aircraft, tools, supplies, and meals. The IC will place all resource orders through the Dispatcher, and specify what is needed, when it is needed, and where it is needed. The Dispatcher will promptly determine if the resource orders can be filled or procured locally and notify the IC. **If a resource order can not be filled locally, the Dispatcher will place the order with the North Dakota Dispatch Center (1-701-768-2552).** The Zone FMO at J. Clark Salyer NWR or the Center Coordinator will generally be able to assist with ordering resources from outside the area.

Requests for assistance by cooperators on fires not threatening the Refuge must be made to the Project Leader or designee. Only qualified and properly equipped resources meeting NWCG standards will be dispatched off of the Refuge.

3. Communications

A listing of communication frequencies commonly used on the Complex is contained in Appendix M .

4. Initial Attack

Often Initial Attack action is initiated by local volunteer fire departments. Cooperative agreements with local fire agencies will be maintained to provide for cooperative suppression actions. Assistance from local or Federal cooperators will follow the "closest resources" and "total mobility" Principles in accordance with Service policy (Appendix N).

All fires occurring on the Complex and staffed with Service employees will be supervised by a qualified incident commander (IC), when ever possible. The Incident Commander or lead firefighter (also referred to as the IC) will be responsible for all management aspects of the fire until the fire is declared out or he/she is relieved. If a qualified IC is not available, and time permits, one will be ordered through the North Dakota Interagency Dispatch Center. All resources will report to the IC (either in person or by radio) prior to deploying to the fire and upon arrival to the fire. The IC will be responsible for: (1) providing a size-up of the fire to dispatch as soon as possible; (2) determine the resources needed for the fire; and (3) advising dispatch of resource needs on the fire.

The IC will receive general suppression strategy from the Fire Management Plan, but appropriate tactics used to suppress the fire will be up to the IC to implement. **Minimum impact suppression tactics (MIST)** will be used whenever possible.

5. Escaped Fires/Extended Attack

Whenever it appears a fire will escape initial attack efforts, leave Service lands, or when fire complexity exceeds the capabilities of command or operations, the IC will take appropriate, proactive actions to ensure additional resources are ordered. The IC, through dispatch or other means, will notify the Zone FMO of the situation. The **Zone FMO** will assist the Project Leader complete a Wildland Fire Situation Analysis (WFSa) and Delegation of Authority (Appendix O).

6. Mop up Standards and Emergency Stabilization and Rehabilitation

The IC will be responsible for mop-up and mitigation of suppression actions taken on Refuge fires. The mop-up standards established in the Fireline Handbook will be followed. Refuge fires will be patrolled or monitored until declared out.

Prior to releasing all firefighters from a wildland fire the following actions will be taken:

- G All trash will be removed.
- G Firelines will be refilled and waterbars added if needed.
- G Hazardous trees and snags cut and the stumps cut flush.
- G Disked firelines should be compacted as soon as possible to preserve the living root stock of natives grasses.
- G Overturned sod resulting from plowing must be rolled back with a grader or by hand and compacted to preserve native grass root stock.

Other emergency stabilization and emergency rehabilitation measures may be taken in accordance with Chapter 5 of the Fire Management Handbook. Briefly:

- G Emergency stabilization is the use of appropriate emergency stabilization techniques in order to protect public safety and stabilize and prevent further degradation of cultural and natural resources in the perimeter of the burned area and downstream impact areas from erosion and invasion of undesirable species. The Incident Commander may initiate Emergency Stabilization actions before the fire is demobilized, as delegated by the Agency Administrator, but emergency stabilization activities may be completed after the fire is declared out.
- G Rehabilitation is the use of appropriate rehabilitation techniques to improve natural resources as stipulated in approved refuge management plans and the repair or replacement of minor facilities damaged by the fire. Total "rehabilitation" of a burned area is not within the scope of the Emergency Rehabilitation funding. Emergency Rehabilitation funding can be used to begin the rehabilitation process if other funding is committed to continue the rehabilitation throughout the life of the project (beyond the initial 3 years of Emergency Rehabilitation funding). Major facilities are repaired or replaced through supplemental appropriations of other funding.
- G Because of the emergency nature of the fire event, the emergency stabilization section of the Emergency Stabilization and Rehabilitation Plan (ESR Plan) must be developed expeditiously and is frequently developed by a local unit or designated burned area ESR team. The rehabilitation section of the ESR Plan is not considered an emergency, and is developed as other refuge land use plans. The refuge manager is responsible for preparing all ESR Plans. The refuge manager and Regional Director will approve all ESR Plans as meeting resource management objectives.

7. Limits to Suppression Activities

- a. The use of earth moving equipment for suppression activities

(dozers, graders, plows) on the Refuge will not be permitted without the approval of the Project Leader.

- b. Foams or Aerial Retardants will not be used within 300 feet of a waterway.

- b. Fires will be suppressed in a cost effective manner.

X. PRESCRIBED FIRE PROGRAM

A. Introduction

The Complex has records documenting the use of prescribed fire as a management tool since 1982. From 1982-1997, 7,457 acres have been treated with prescribed fire. Average burn size for the 150 prescribed burns is 50 acres. The Complex uses prescribed fire as a tool in two management areas: resource management and hazard fuels reduction (Appendix F).

The Complex has reached the point where they are in a good position to expand their prescribed burn program. They currently must rely on outside sources for personnel to implement their burns. Depending on future activity, the continued availability of 9263 funding, and FIREBASE runs, the Complex may warrant additional staffing. At that time, adding a full-time or Career-Seasonal Prescribed Fire Specialist to the staff will be considered.

B. The Use of Prescribed Fire to Achieve Resource Management Goals

The Environment Assessment for the Upland Management Plan (April 1994) and other management documents support the use of prescribed fire to achieve resource management goals. Past research has shown that fire is an essential, natural part of the Complex's native biotic communities. The goals of resource management prescribed fire are:

1. Restoration/perpetuation of native grass and forb species.
2. Achieve hazard fuel and resource management objectives.
3. Periodic reduction of dense cattail growth in wetland units.
4. Maintain/rejuvenate nesting cover for waterfowl and other native birds.

5. Reduction and control of non-native grass species and noxious weeds.
6. Control of woody species invasion of grasslands
7. Site preparation for farming and seeding projects.
8. Use in combination with other management tools to achieve desired results.

The primary objective is to treat approximately 4,500 acres per year. The achievement of this objective will require repeated prescribed burns over a 12-15 year period with a 3-5 year burn frequency. As part of the prescribed fire program, a monitoring program will be instituted to verify that objectives are being achieved. Expected fire effects on common species and species of special concern can be found in Appendix D. Additional information can be found on the web at <http://www.fire.org/perl/tools.cgi>

C. Fire Management Units

The Complex will be broken into three (3) Fire Management Units for both Prescribed Fire and Wildfire Suppression. The three units are Audubon NWR, Ilo NWR, and Satellite Areas. The Wildfire Suppression Units will be discussed in Section VII - Fire Management Units - Suppression. The Prescribed Fire Units were designated for the following reasons:

- # The location of firefighters, qualified individuals (Burn Bosses), equipment, and other resources.
- # Remoteness from Headquarters with all the logistical requirements associated with isolated burn units (e.g.: planning, preparation, execution).
- # All three units require additional resources to carry out the burns, however, there are employees on site at Audubon and Ilo NWR's to perform some, if not all the on-site planning and preparation. The fragmented nature of the Satellite Unit requires careful planning and scheduling.

D. Hazard Fuels Reduction Prescribed Fire

The Complex hazard fuel reduction program uses prescribed fire to protect Complex development zones, sensitive resources, specific WPA/WDA and Refuge boundaries from the risk of wildfire. WPA/WDA and Refuge boundary burn units are selected based on values at risk on adjacent land, probability for escape from Service lands, and fuels.

Fuels in hazard fuel sites have 6-10 inches of accumulated litter and/or high densities of shrubs. The large volume of litter can cause control problems during suppression actions. Accumulated litter will allow wildfires to carry even during full green-up conditions. To the greatest extent possible, hazard fuel burns will only be used when they can complement resource management objectives.

Hazard Fuel Burns Objectives:

1. Reduce dead fuel loadings (litter) of 2-3 tons per acre over at least 75% of the burn unit.
2. Reduce woody shrub component by 50%.
3. Treat approximately 670 acres per year.
4. Burn units once every 5-8 years depending on fuel accumulations and resource management considerations.

E. Planning

The managers of each District are responsible for initiating the development of resource management objectives for individual units in their Districts. The Complex Biologist will provide assistance in selection of the appropriate management tool needed to meet the objectives. Prescribed fire is just one of a combination of tools available. If needed, the Zone FMO or Regional Prescribed Fire Specialist will be consulted for assistance in developing a plan or prescription to achieve the desired objectives. The burn plan will document objectives and the plan of action for achieving them. Burn plans can be written by any qualified burn boss or other experienced individual.

Annual work planning is coordinated between each District Manager and Complex Biologist. Potential burn units will be selected as part of the process and the draft list reviewed for sound biological practices by the Complex Biologist. A review of the previous years prescribed fire accomplishments, failures, and any monitoring results will also take place at this time. Burn plans developed as part of this process will be submitted for review to the Zone FMO and to the Project Leader for approval. The Project Leader will prioritize the units to be burned on a Complex-wide basis.

Contingency planning is an integral part of the prescribed fire planning process, and begins with the first visit to the burn unit. It is important to identify in advance, circumstances or conditions that may require the implementation of the contingency plan. Each prescribed burn plan will include a section that thoroughly addresses the actions to be taken in the event a prescribed burn must be suppressed or managed as a wildfire.

The contingency plan will identify:

7. The individual(s) who has the authority to activate the contingency plan.
8. Clearly defined conditions (“trigger points”) that indicate the contingency plan should be activated.
9. A listing of those to be notified or contacted.
10. Who assumes the duties of the Incident Commander and what are the roles of others.
11. The location of values at risk and other resources requiring protection
12. The preferred strategies and tactics.
13. The location of containment lines or natural fuel breaks outside the burn unit.
14. The location of water refill points, staged equipment, etc.
15. Contingency forces (Type, number, location).

A prescribed burn will not be implemented unless all contingency forces are confirmed as being on-site or in standby status, as specified in the plan.

F. Preparation and Implementation

The AGWMD Manager is responsible for preparing all fire equipment used for prescribed burning prior to April 1. Prescribed burn units may require preparation including; mowlines, blacklines and contacting the public. Preparation for burns will be handled on an individual basis and responsibilities will be identified in the prescribed burn plan for that unit.

The normal prescribed burn season begins approximately April 1, depending on snowmelt. The season continues until late fall, approximately October 30. The time when a particular unit is burned depends on burn objectives. Some burning may occur during late fall and winter depending on snow conditions. These burns are generally for cattail control in wetlands or blacklines to be used as control lines for future burn units.

G. Limits

Each prescribed burn unit requires an open burning permit from the North Dakota Department of Environmental Health. Procedures for obtaining permits can be found in Section XI.

Multiple units may be burned at the same time within the Complex. The maximum number of simultaneous burns will depend on the cumulative impacts of smoke on sensitive targets. The Zone FMO or other qualified Prescribed Fire Manager will be assigned to coordinate the management of simultaneous burns. It is not required that the Prescribed Fire Manager be on-site during the burns. Sufficient suppression forces must be available for each burn in the event of an escape.

Audubon Complex is within the Northern Rockies Interagency Fire Coordination Area. Prescribed fires cannot be ignited when the Northern Rockies Area is in fire danger preparedness level V and/or the National Preparedness level is V. When the North Dakota Rangeland Fire Danger Index is in the Very High or Extreme category, verbal permission must be obtained from the local rural fire protection district chief.

Drought can have an effect on fire severity and control. One or more drought indicators (PDI - KBI) will be used to determine the degree of drought. These indicators can be access on the web at <http://www.boi.noaa.gov/fwweb/fwoutlook.htm> .

H. Complexity

Prescribed fire complexity will be determined by the FWS Region 6 Complexity Analysis. All Prescribed fires currently being considered are of low complexity; however, moderate complexity burns are possible.

I. Monitoring and Evaluation

1. Introduction

Past monitoring and evaluation of prescribed fires has been limited due to funding and staffing limitations. Burn prescriptions and timing are based on past research (Higgins, Smith, Kruse, Kirsch, and others). Pre-burn evaluation was limited to general photographs and/or qualitative evaluation of fuel conditions and green up conditions. Burn day evaluations documented weather (many times not on site) and limited documentation of fire behavior. Subjective measurements (visual) such as the percent of fuel consumed were also made. Post burn evaluation was

limited to subjective qualitative estimates of species response and effectiveness in achieving objectives.

Although little site specific data on the effects of fire for the Complex exists, general conclusions can be made from the Fire Effects Information System. Appendix B contains a table which depicts the anticipated effects of fire on plant species that are found on the Complex.

Fire monitoring protocols for the Region or Service will be used at Complex. (Appendix P). When the fire management program proposed by this plan is fully funded, a more quantitative monitoring program may be implemented. Protocols will be established to determine if burn objectives are being met and long term monitoring will be conducted to determine vegetation responses.

2. First Order Fire Effects Monitoring Program

- a. **Environmental Conditions** will be recorded at the site periodically prior to ignition and hourly during the burn. Conditions to be evaluated include Air Temperature, RH, and Wind speed and direction.
- b. **Fuel moisture(s)** will be measured or estimated using tables, charts, or other prediction system (BEHAVE).
- c. **Fire Behavior** such as flame length and rates of spread will be recorded.
- d. **Post fire effects** will be measured or estimated. These effects include scorch height, percent of area burned, percent of fuel consumed - based on fuel (time-lag) classification, amount of duff removed, etc.

J. Prescribed Fire Impacts

1. Environmental impacts

Environmental impacts of the prescribed fire program are discussed in previous sections of this Fire Management Plan. Air quality issues will be discussed in Section XI.

2. Social and economic impacts

The Complex covers three counties east of the Missouri River and 14 counties west of the Missouri River. The main industry in the area is agriculture and most all other industry is also agriculture related. The overall social and economic environment can be affected by how the uplands on the Complex are managed. Often the effect is local, but when all Complex land units are combined, the affect is more widespread. Habitat management is often accomplished by authorizing local farmers to hay or graze on Complex units. This is viewed as positive both socially and economically. Local farmers and ranchers prefer to hay or graze lands on the Complex rather than seeing them burned.

The majority of neighbors accept the fact that the Federal government owns land and have a general appreciation for the value of wildlife. Neighboring landowners do expect the land to be managed for wildlife and not ignored. If Complex lands are ignored, allowing habitat condition to decline and noxious weeds to increase, opinions quickly become negative. If the land is managed for the best interest of wildlife and habitat conditions are maintained, these opinions become positive and wildlife benefits both on and off Complex managed lands. Prescribed fire is viewed by many as one of the tools necessary to manage Service lands.

The majority of recreational uses on the Complex are centered around hunting, fishing and birdwatching. The Complex's WPA's and WDA's offer excellent waterfowl, upland game and big game hunting. Audubon and Lake Ilo Refuges provide visitors with birding and fishing opportunities. Outdoors enthusiast come from all over the United States to visit the Complex. Annual visitation is estimated at 12,000 per year. Prescribed burning is an important tool used to maintain highly productive wildlife cover. The resulting increase in wildlife populations brings recreational dollars into local economies.

XI. AIR QUALITY AND SMOKE MANAGEMENT GUIDELINES

Each prescribed burn unit requires an open burning permit from the North Dakota Department of Environmental Health. Permits to open burn are required under the authority of the North Dakota Air Pollution Control Rules (Article 33-15, North Dakota Administrative Code). Written requests are submitted by the Complex to the Department of Environmental Health for each planned prescribed burn. Requests must identify acres to be burned, location, and purpose of the burn. The State grants approval in letter form and also notifies local and district Environmental Health Practioners. See Refuge files: State of North Dakota Conditions/Restrictions Applicable to Obtain and Approval to Open Burn.

Smoke complaints are investigated by the State Department of Environmental Health. To

date, the State has received no complaints concerning smoke from Complex prescribed fires or wildfires.

The management of smoke will be incorporated into the planning of prescribed fires, and to the extent possible, in suppression of wildfires. Sensitive areas are identified and precautions are taken to safeguard neighbors, local traffic and visitors. Temporary air quality impacts from smoke may occur, but are mitigated by the fuel type (light flashy fuels), small burn unit size, and consultation with state air quality personnel. Smoke dispersal is a consideration in determining whether or not a prescribed burn is within prescription. Fine grass fuels and small burn size (80-600 acres) generate low volumes of smoke for short duration (4-5 hours).

Complex personnel also take special care to notify neighbors, fire departments, and local law enforcement agencies on burn day. These actions are specific requirements of individual burn plans.

XII. FIRE RESEARCH NEEDS

The Complex will continue to encourage fire related research projects on FWS lands where research operations will not conflict with unit management objectives. At present there are no specific issues which the Complex staff feel need research. Fire monitoring is discussed in previous sections of this plan, see Section X - I.

XIII. ADDITIONAL OPERATIONAL ELEMENTS

A. Public Safety

Firefighter and public safety will always take precedence over property and resource protection during any fire management activity. Firefighter safety is covered in Section IX-B. This section will deal with public safety.

Fire fronts in grass fuels are fast moving and dangerous. However due to the small size of most Complex units, entrapment is not considered to be a big threat to sportsmen/visitors who may be in the area. Neighbors who initiate their own suppression actions lack proper training, equipment, and communications and may be at higher risk. The Complex staff will make every effort to keep the fire scene (wildfire and prescribed fire) clear of people except for Service firefighters and cooperating volunteer fire departments participating in the incident management process. Burn areas are usually closed to the public during prescribed fires.

Smoke from a wildfire or prescribed burn could impair visibility on roads and become a hazard. During wildfires the IC is responsible for contacting the local law enforcement agency having jurisdiction to manage traffic hazards from

smoke. Smoke from prescribed fires is part of the burn prescription and it is the burn boss's responsibility to monitor smoke. Actions to manage smoke include: use of road guards and pilot car, signing, altering ignition techniques and sequence, halting ignition, and suppressing the fire.

Wildfires which might escape from FWS lands and spread to inhabited private property are also a concern. The IC is responsible for notifying the local law enforcement agency having jurisdiction if it is necessary to warn or evacuate the public from potentially dangerous wildfires. Additionally the Complex will continue where practical to use prescribed fire to manage hazard fuels in high risk areas to reduce the threat to visitors and others as the result of a prescribed fire.

B. Public Information and Education

Informing the public is an important part of fire suppression, fire prevention, prescribed fire, and the FWS mission. During wildfires the IC is responsible for providing fire information to the press and the public. The IC may delegate this task as needed.

Informing the public is a vital element of the prescribed fire program. The following actions will be used to promote the prescribed fire program to the public:

- # Press releases
- # Attendance at local volunteer fire department meetings
- # Including the prescribed fire message in Complex interpretive publications and materials
- # Personal contact with bystanders during prescribed burns
- # Following prescribed burn plans and preventing escapes
- # Developing a quantitative fire effects monitoring program and sharing results with the public

C. Fire Critique and Annual Fire Plan Review

1. Fire Plan Review

The Fire Management Plan will be reviewed annually to ensure the fire program advances and evolves with the Service and Complex's mission and updated as necessary. The Fire Management Plan will be reviewed upon completion of the Upland Management Plan and the Comprehensive Conservation Plan to insure that goals and objectives identified in this plan are still valid.

2. Wildfire Critique and Review

Wildfires will be critiqued by the IC and documented on the DI-1202. The Zone FMO and the Regional Fire Management Coordinator or his designee will conduct formal fire critiques in the event of:

- # Significant injury/accident/death
- # Significant property or resource damage
- # Significant safety concerns are raised

3. Prescribed Fire

Wildfires will be critiqued by the Burn Boss and documented on the DI-1202. The Zone FMO and the Regional Fire Management Coordinator or his designee will conduct formal fire critiques in the event of:

- # Significant injury/accident/death
- # Significant property or resource damage
- # Significant safety concerns are raised
- # Significant smoke management problems occur

D. Records and Reports

The incident commander (IC) on a wildland fire or the prescribed fire burn boss on a prescribed burn will be responsible for the completion of a DI-1202 Fire Report as well as Crew Time Reports for all personnel assigned to an incident and return these reports to the AGWMD Manager within 3 days of the fire being declared out. The IC or burn boss should include a list of all expenses and/or items lost on the fire and a list of personnel assignments on the DI-1202. The AGWMD Manager will enter all data into the FMCS computer database within 10 days after the fire is declared out. The AGWMD Manager will also inform the timekeeper of all time and premium pay to be charged to the fire and ensure expended supplies are replaced.

XIV. CONSULTATION AND COORDINATION

All fire management program activities will be implemented in cooperation and coordination with the State of North Dakota, North Dakota Department of Environmental Health, and rural fire protection districts. Other agencies and organizations will be consulted with as needed.

General program consultation and coordination will be sought from the Zone FMO, Regional Fire Management Coordinator, Regional Prescribed Fire Specialist, and the National Interagency Fire Center (NIFC).

The following were consulted in the development of this plan:

Carl Douhan, Prescribed Fire Specialist
Brian McManus, ND/SD Zone FMO
Lou Ballard, UT/CO Zone FMO
Staff at Audubon Complex
Staff at Arrowwood Complex

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ATTACHMENT 1: EA AND FONSI FOR UPLAND HABITAT MANAGEMENT (1994)

APPENDIX A - RESOURCE MANAGEMENT PLANS, GOALS, AND OBJECTIVES

APPENDIX B - FIRE EFFECTS

APPENDIX C - WILDLIFE CHECKLIST

APPENDIX D - SPECIES OF SPECIAL CONCERN

Threatened, Endangered, Candidate Species Found in Audubon Complex

Bald Eagle (<i>Haliaeetus leucocephalus</i>)	endangered
Peregrine falcon (<i>Falco peregrinus</i>)	endangered
Whooping crane (<i>Grus Americana</i>)	endangered
Least Tern (<i>Sterna antillarum</i>)	endangered
Piping plover (<i>Charadrius melodus</i>)	threatened
Black tern (<i>Chlidonias niger</i>)	candidate
Ferruginous hawk (<i>Buteo regalis</i>)	candidate
Baird's sparrow (<i>Ammodramus bairdii</i>)	candidate
Loggerhead shrike (<i>Lanius ludovicianus</i>)	candidate
Dakota skipper (<i>Hesperia dacotae</i>)	candidate

APPENDIX E - BIRD CHECKLIST

APPENDIX F - COMPLEX FIRE HISTORY

APPENDIX G - NORMAL UNIT STRENGTH

Table 1: Audubon NWR Normal Unit Strength - Equipment

Item	Year Purchased	Percent of Fire Funding	Have	GVW	Need	GVW
Engine Module(s)						
medium 300 gal. GMC	1997	100%	1	12k		
medium 250 gal. Chev.	1983	none	1	10k	1	15k
Slip-on unit(s)						
250 gal	1997	100%	1			
300 gal	1983	100%	1			
Water Tender(s)						
1000 gal GMC	1984	none	1	24.5k		
Portable Pump(s)						
Standard	1995	100%	2			
	1987	100%				
Power Saw(s)	1996	100%	2			
Mower(s)						
Rotary Mower 10"	1996	100%	1			
Sickle Troy Built 4"	1996	100%	1			
Tractor(s)						
Grader(s)						
Plow Unit/Disk						
ATV(s)						
Polaris 6X6 50 gal slipon	1995	100%	1			
Other List						
1000 g. Fol-da-tank	1998	100%	1			

Other Equipment Available for Fire Suppression or Prescribed Fire Operations Not Fire Funded
Sickle Mower 9"
Ford 100 hp Tractor
John Deere 55 hp Tractor
John Deere 55 hp Tractor
Caterpillar Grader 12"

Use the table to list capital equipment used for preparedness and initial attack or for prescribed fire activities funded wholly or in part by fire.

Radios are listed on a separate inventory

Indicate the year purchased, if known, and the percent of fire funding (e.g.: The station purchased a tractor. Fire paid 25% and the station secured other funding for the remainder.)

Table 2: Ilo NWR Normal Unit Strength - Equipment

Item	Year Purchased	Percent of Fire Funding	Have	GVW	Need	GVW
Engine Module(s)						
medium 300 gal.	1992	100%	1	12k		
Light	1985	none	1	8.6k	1	15k
Slip-on unit(s)						
200 gal	1987	100%	1			
200 gal	1970	unk	1		1	
Water Tender(s)						
500 gal Trailor	1991	100	1	na		
Portable Pump(s)						
Standard	1996	100%				
	1981	100%	2			
Power Saw(s)	1997	100%	1			
Mower(s)						
Rotary Mower 10"	1996	none	1			
Sickle Troy Built 4"	1996	100%	1			
Tractor(s)						
Grader(s)						
Plow Unit/Disk						
ATV(s)						
Polaris 6X6 50 gal slipon	1995	100%	1			
Other List						

Other Equipment Available for Fire Suppression or Prescribed Fire Operations Not Fire Funded
Rotary Mower 10'
John Deere 55 hp Tractor
Disk

Use the table to list capital equipment used for preparedness and initial attack or for prescribed fire activities funded wholly or in part by fire.

Radios are listed on a separate inventory

Indicate the year purchased, if known, and the percent of fire funding (e.g.: The station purchased a tractor. Fire paid 25% and the station secured other funding for the remainder.)

Table 3: Audubon NWR Normal Unit Strength - Fire Cache Inventory

Table 4: Ilo NWR Normal Unit Strength - Fire Cache Inventory

APPENDIX H**EMPLOYEE QUALIFICATIONS****Table 1 - Audubon NW**

Employee	Wildfire	Prescribed Fire
GOOS, Michael	FFT2 FFT1 ENOP	RXB3 RXI2 FFT2 FFT1 ENGB
GRABOW, Mike	FFT2 ENOP	RXI2 FFT2 ENGB
GRAVNING, Jon	FFT2	FFT2
HULTBERG, Harold	FFT2	FFT2 ENGB RXB3 (T) RXI2 (T)
JACOBSON, Jacquelyn	FFT2	RXI2 FFT2

LANGE, James	FFT2 ENOP	FFT2 ENGB RXI2 RXB3 (T)
MAUTZ, Brian	FFT2	FFT2
POTTER, David	FFT2 ENOP	FFT2 ENGB RXI2
SMITH, Peter	FFT2	FFT2

Table 2 - Lake Ilo NWR

Employee	Wildfire	Prescribed Fire
BOZOVSKY, Donald	FFT2	FFT1 ENGB RXI2 RXB3

Note: Certain individuals may be qualified less fitness - December 30., 1998

APPENDIX - PHYSICAL FITNESS

APPENDIX J

STEP-UP PLAN

The North Dakota Rangeland Fire Danger Index will be obtained by calling the NWS in Bismarck. The Rangeland Fire Index are rated as Low, Medium, High, Very High or Extreme. The AGWMD Manager or assigned burn boss will monitor current and predicted fire weather reports and take appropriate actions as listed in the following Fire Step Up Plan.

PREDAREDNESS ACTION	RANGELAND FIRE INDEX				
	LOW	MED	HIGH	V H	EXT
Maintain Radio Contact	X	X	X	X	X
Maintain Response Time of ____ Minutes	60	60	60	20	10
Fire-ready Engine at Refuge Headquarters	X	X	X	X	X
Carry PPE while on duty, Wear Nomex & Boots				X	X
Water Tender on Standby				X	X
Tour of Duty Changed at PL's Discretion				X	X

Detection Patrol Conditional				X	X
Refuge Fire Ban Conditional				X	
Refuge Fire Ban Mandatory					X
Request Fire Crew - Place on Standby				X	X

APPENDIX K

LISTING OF CURRENT FIRE QUALIFIED PERSONNEL

1999

NAME	WORK PHONE	HOME PHONE

APPENDIX L

DISPATCH PLAN

AUDUBON NATIONAL WILDLIFE REFUGE COMPLEX

Upon report of smoke or fire:

I. Record as much information as possible from the caller:

- # Name:
- # Callback number:
- # Location of Smoke or Fire:
- # Access Route:
- # Color of Smoke:
- # Size of Fire:
- # Fuels (What's burning?):
- # Fire Behavior (What's the fire doing?):
- # Improvements Threatened:
- # Anyone at the Scene:
- # How did it Start?:
- # Suspects:

II. Maintain a log of all radio and telephone calls (Log Form Attached)

III. Check Map for Ownership/Protections Status

IV. For a Fire on Service lands or Within 2 Mile Initial Attack Zone:

A. Outside Regular Working Hours use Fire Personnel Directory to Contact Refuge Staff. Start with AWMD Manager and work down the list until adequate staff is notified to respond to the situation.

B. During Regular Working Hours:

- # Notify AWMD Manager
- # Utilize Clerk if available, or use other staff member as Dispatcher.

- # Select and dispatch an Incident Commander (Should be qualified IC or can be highest qualified firefighter available.)
- # Dispatch appropriate resources. Do not dispatch unqualified firefighters for line duty.
- # If fire danger is high to extreme, request a spot weather forecast from the North Dakota Dispatch Center **(701) 768-2552**
- # Remain on duty and provide further assistance as requested by IC.

C. If fire is on Service lands but involves a structure contact the appropriate fire department.

V. For a Fire Not on the Refuge or Threatening Service Lands:

A. Mutual Aid Requests

- # Take Resource Order information (Nature of Incident, Location and Assess to Fire, Resources Requested, Where, When, and to Whom they are to Report, Radio Frequency, and Name of IC)
- # Notify Project Leader and get approval for the Dispatch.
- # Dispatch requested resources
- # Notify Requestor of what resources were dispatched and give and estimated time of arrival
- # Remain on duty until relieved or released.

B. Interagency Dispatch Request

- # Take Resource Order information (Name of Incident, Location and Assess to Fire, Resources Requested, Where, When, and to Whom they are to Report, Travel Instructions, Resource Order Number and Request Number, and Agency responsible for incident)
- # Inform requestor that you will check with Project Leader to determine availability of requested resources.
- # Notify Project Leader and get approval for dispatch
- # Call the requestor back ASAP (Must be within 1 hour) and inform him of what resources were dispatched and provide an estimated time of arrival at the reporting location.
- # See the Regional Fire Dispatch Plan for further details

RADIO TELEPHONE LOG

[illegible]

APPENDIX M

AUDUBON NATIONAL WILDLIFE REFUGE COMPLEX COMMUNICATION FREQUENCIES

Frequency Owner	Refuge Tac	Transmit Frequency	Receive Frequency
Refuge Direct - ADB			
Refuge Repeater			
Refuge Direct - Ilo			

APPENDIX N - LIST OF COOPERATORS/AGREEMENTS

WILDLAND FIRE SITUATION ANALYSIS

Incident Name:

Jurisdiction:

Date and Time Completed:

This page is completed by the Agency Administrator(s).

Section I, WFSA Information Page

- A. Jurisdiction(s): Assign the agency or agencies that have or could have fire protection responsibility, e.g., USFWS, BLM, etc.
- B. Geographic Area: Assign the recognized "Geographic Coordination Area" the fire is located in, e.g., Northwest, Northern Rockies, etc.
- C. Unit(s): Designate the local administrative unit(s), e.g., Hart Mountain Refuge Area, Flathead Indian Reservation, etc.
- D. WFSA #: Identify the number assigned to the most recent WFSA for this fire.
- E. Fire Name: Self-explanatory.
- F. Incident #: Identify the incident number assigned to the fire.
- G. Accounting Code: Insert the local unit's accounting code.
- H. Date/Time Prepared: Self-explanatory.
- I. Attachments: Check here to designate items used to complete the WFSA. "Other" could include data or models used in the development of the WFSA. Briefly describe the "other" items used.

I. Wildland Fire Situation Analysis		
To be completed by the Agency Administrator(s)		
A. Jurisdiction(s)	B. Geographic Area	
C. Unit(s)	D. WFSA #	
E. Fire Name	F. Incident #	
G. Accounting Code:		
H. Date/Time Prepared _____ @ _____		
I. Attachments		
- Complexity Matrix/Analysis *	_____	
- Risk Assessment/Analysis *	_____	
Probability of Success *	_____	
Consequences of Failure *	_____	
- Maps *	_____	
- Decision Tree **	_____	
- Fire Behavior Projections *	_____	

- Calculations of Resource Requirements *	_____	
- Other (specify)	_____	
* Required		
** Required by FWS		

This page is completed by the Agency Administrator(s).

Section II. Objectives and Constraints

- A. Objectives: Specify objectives that must be considered in the development of alternatives. Safety objectives for firefighter, aviation, and public must receive the highest priority. Suppression objectives must relate to resource management objectives in the unit resource management plan.

Economic objectives could include closure of all or portions of an area, thus impacting the public, or impacts to transportation, communication, and resource values.

Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire.

Other objectives might include legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

- B. Constraints: List constraints on wildland fire action. These could include constraints to

designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management/air quality concerns. Economic constraints, such as public and agency cost, could be considered here.

II.	Objectives and Constraints
To be Completed by the Agency Administrator(s)	

A. Objectives (Must be specific and measurable)

1. Safety

- Public

- Firefighter

2. Economic

3. Environmental

4. Social

5. Other

B. Constraints

This page is completed by the Fire Manager and/or Incident Commander.

Section III. Alternatives

- A. Wildland Fire Management Strategy: Briefly describe the general wildland fire strategies for each alternative. Alternatives must meet resource management plan objectives.
- B. Narrative: Briefly describe each alternative with geographic names, locations, etc., that would be used when implementing a wildland fire strategy. For example: "Contain within the Starvation Meadows' watershed by the first burning period."
- C. Resources Needed: Resources described must be reasonable to accomplish the tasks described in Section III.B. It is critical to also look at the reality of the availability of these needed resources.
- D. Final Fire Size: Estimated final fire size for each alternative at time of containment.
- E. Estimated Contain/Control Date: Estimates of each alternative shall be made based on predicted weather, fire behavior, resource availability, and the effects of suppression efforts.
- F. Cost: Estimate all incident costs for each alternative. Consider mop-up, rehabilitation, and other costs as necessary.
- G. Risk Assessment - Probability of Success/Consequences of Failure: Describe probability as a percentage and list associated consequences for success and failure. Develop this information from models, practical experience, or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs, and other information such as park closures and effect on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.
- H. Complexity: Assign the complexity rating calculated in "Fire Complexity Analysis" for each alternative, e.g., Type II, Type I.
- I. A map for each alternative should be prepared. The map will be based on the "Probability of Success/Consequences of Failure" and include other relative information.

III. Alternatives (To be completed by FMO / IC)			
	A	B	C
A. Wildland Fire Strategy			
B. Narrative			
C. Resources needed Handcrews Engines Dozers Airtankers Helicopters	 	 	

D. Final Size			
E. Est. Contain/ Control Date			
F. Costs			
G. Risk Assessment - Probability of success - Consequence of failure	 	 	
H. Complexity			
I. Attach maps for each alternative			

This page is completed by the Agency Administrator(s), FMO and/or Incident Commander.

Section IV. Evaluation of Alternatives

- A. Evaluation Process: Conduct an analysis for each element of each objective and each alternative. Objectives shall match those identified in Section II.A. Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element. Fire effects may be negative, cause no change, or may be positive. Examples are: 1) a system which employs a "-" for negative effect, a "0" for no

change, and a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, -100 to +100, etc.) to each consideration, then arrives at a weighted average. If you have the ability to estimate dollar amounts for natural resource and cultural values, this data is preferred. Use those methods which are most useful to managers and most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the resource management plan and consistent with prescriptions and objectives of the fire management plan.

Sum of Economic Values: Calculate for each element the net effect of the rating system used for each alternative. This could include the balance of:
pluses (+) and minuses (-), numerical rating (-3 and +3), or natural and cultural resource values in dollar amounts. (Again, resource benefits may be used as part of the analysis process when the wildland fire is within a prescription consistent with approved Fire Management Plans and in support of the unit's Resource Management Plan.)

IV. Evaluation of Alternatives			
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
A. Evaluation Process	A	B	C
<i>Safety</i> Firefighter Aviation Public			
<i>Sum of Safety Values</i>			

<i>Economic</i> Forage Improvements Recreation Timber Water Wilderness Wildlife Other (specify)			
<i>Sum of Economic Values</i>			
<i>Environmental</i> Air Visual Fuels T & E Species Other (specify)			
<i>Sum of Environmental Values</i>			

<i>Social</i>			
Employment			
Public Concern			
Cultural			
Other (Specify)			
<i>Sum of Social Values</i>			
<i>Other</i>			

This page is completed by the Agency Administrator(s) and Fire Manager and/or Incident Commander.

Section V. Analysis Summary

- A. Compliance with Objectives: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narrative could be based on effectiveness and efficiency. For example: "most effective and least efficient," "least effective and most efficient," or "effective and efficient." Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective." Use a system that best fits the manager's needs.
- B. Pertinent Data: Data for this Section has already been presented, and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final Fire Size is displayed in Section III.D. Complexity is calculated in the attachments and displayed in Section III.H. Costs are displayed on page 4. Probability of Success/Consequences of Failure is calculated in the attachments and displayed in Section III.G.
- C. External and Internal Influences: Assign information and data occurring at the time the WFS is signed. Identify the Preparedness Index (1 through 5) for the National and Geographic levels. If available, indicate the Incident Priority assigned by the MAC Group. Designate the Resource Availability status. This information is available at the Geographic Coordination Center, and is needed to select a viable alternative. Designate "yes," indicating an up-to-date weather forecast has been provided to, and used by, the Agency Administrator(s) to evaluate each alternative. Assign information to the "Other" category as needed by the Agency Administrator(s).

Section IV. Decision

Identify the alternative selected. Must have clear and concise rationale for the decision, and a signature with date and time. Agency Administrator(s) is mandatory.

V. Analysis Summary			
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
Alternatives	A	B	C
A. Compliance with Objectives Safety Economic Environmental Social Other			
B. Pertinent Data Final Fire Size Complexity Suppression Cost Resource Values Probability of Success Consequences of Failure			

C. External / Internal Influences

National & Geographic

Preparedness Level

Incident Priority

Resource Availability

Weather Forecast

(long-range)

Fire Behavior Projections

VI.

Decision

The Selected Alternative is: _____

Rationale:

Agency Administrator's Signature

Date/Time

This Section is completed by the Agency Administrator(s) or designate.

Section VII. Daily Review

The date, time, and signature of reviewing officials are reported in each column for each day of the incident. The status of Preparedness Level, Incident Priority, Resource Availability, Weather Forecast, and WFSA validity is completed for each day reviewed. Ratings for the Preparedness Level, Incident Priority, Resource Availability, Fire Behavior, and Weather Forecast are addressed in Section V.C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA. A "no" indicates this WFSA is no longer valid and another WFSA must be prepared or the original revised.

Section VIII. Final Review

This Section is completed by the Agency Administrator(s). A signature, date, and time are provided once all conditions of the WFSA are met.

VIII.

Daily Review

To be completed by the Agency Administrator(s) or Designate								
Selected to be reviewed daily to determine if still valid until containment or control								
			P	I	R	W	F	W
			R	N	E	E	I	F
			E	C	S	A	R	S
			P	I	O	T	E	A
			A	D	U	H		
			R	E	R	E	B	V
			E	N	C	R	E	A
			D	T	E	F	H	L
			N			O	A	I
			E	P	A	F	V	D
S	R	V	O	R				
S	I	A	E	I				
	O	I	C	O				
L	R	L	A	P				
E	I	A	S	R				
V	T	B	T	O				
E	Y	I		J				
L		L		E				
		I		C				
		T		T				
		Y		I				
				O				
				N				
				S				
Date	Time	By						

If WFSA is no longer valid, a new WFSA will be completed!

VIII. Objectives

Final Review

The elements of the selected alternative were met on: _____
Date Time

By: _____
(Agency Administrator(s))

A GUIDE FOR ASSESSING FIRE COMPLEXITY

The following questions are presented as a guide to assist the Agency Administrator(s) and staff in analyzing the complexity or predicted complexity of a wildland fire situation. Because of the time required to assemble or move an Incident Management Team to wildland fire, this checklist should be completed when a wildland fire escapes initial attack and be kept as a part of the fire records. This document is prepared concurrently with the preparation of (and attached to) a new or revised Wildland Fire Situation Analysis. It must be emphasized this analysis should, where possible, be based on predictions to allow adequate time for assembling and transporting the ordered resources.

Use of the Guide:

1. Analyze each element and check the response "yes" or "no."
2. If positive responses exceed, or are equal to, negative responses within any primary factor (A through G), the primary factor should be considered as a positive response.
3. If any three of the primary factors (A through G) are positive responses, this indicates the fire situation is, or is predicted to be, Type I.
4. Factor H should be considered after all the above steps. If more than two of these items are answered "yes," and three or more of the other primary factors are positive responses, a Type I team should be considered. If the composites of H are negative, and there are fewer than three positive responses in the primary factors (A-G), a Type II team should be considered. If the answers to all questions in H are negative, it may be advisable to allow the existing overhead to continue action on the fire.

GLOSSARY OF TERMS

Potential for blow-up conditions - Any combination of fuels, weather, and topography excessively endangering personnel.

Rate or endangered species - Threat to habitat of such species or, in the case of flora, threat to the species itself.

Smoke management - Any situation which creates a significant public response, such as smoke in a metropolitan area or visual pollution in high-use scenic areas.

Extended exposure to unusually hazardous line conditions - Extended burnout or backfire situations, rock slide, cliffs, extremely steep terrain, abnormal fuel situation such as frost killed foliage, etc.

Disputed fire management responsibility - Any wildland fire where responsibility for management is not agreed upon due to lack of agreements or different interpretations, etc.

Disputed fire policy - Differing fire policies between suppression agencies when the fire involves multiple ownership is an example.

Pre-existing controversies - These may or may not be fire management related. Any controversy drawing public attention to an area may present unusual problems to the fire overhead and local management.

Have overhead overextended themselves mentally or physically - This is a critical item that requires judgment by the responsible agency. It is difficult to write guidelines for this judgment because of the wide differences between individuals. If, however, the Agency Administrator feels the existing overhead cannot continue to function efficiently and take safe and aggressive action due to mental or physical reasons, assistance is mandatory.

FIRE COMPLEXITY ANALYSIS

A. FIRE BEHAVIOR: Observed or Predicted		Yes/No	
1.	Burning Index (from on-site measurement of weather conditions). Predicted to be above the 90% level using the major fuel model in which the fire is burning.	___	___
2.	Potential exists for "blowup" conditions (fuel moisture, winds, etc.)	___	___
3.	Crowning, profuse or long-range spotting.	___	___
4.	Weather forecast indicating no significant relief or worsening conditions.	___	___
Total		___	___

B. RESOURCES COMMITTED

- | | | | |
|----|--|-----|-----|
| 1. | 200 or more personnel assigned. | ___ | ___ |
| 2. | Three or more divisions. | ___ | ___ |
| 3. | Wide variety of special support personnel. | ___ | ___ |
| 4. | Substantial air operation which is not properly staffed. | ___ | ___ |
| 5. | Majority of initial attack resources committed. | ___ | ___ |

Total ___ ___

C. RESOURCES THREATENED

- | | | | |
|----|--|-----|-----|
| 1. | Urban interface. | ___ | ___ |
| 2. | Developments and facilities. | ___ | ___ |
| 3. | Restricted, threatened or endangered species habitat. | ___ | ___ |
| 4. | Cultural sites. | ___ | ___ |
| 5. | Unique natural resources, special designation zones or wilderness. | ___ | ___ |
| 6. | Other special resources. | ___ | ___ |

Total ___ ___

D. SAFETY

- | | | | |
|----|--|-----|-----|
| 1. | Unusually hazardous fire line conditions. | ___ | ___ |
| 2. | Serious accidents or facilities. | ___ | ___ |
| 3. | Threat to safety of visitors from fire and related operations. | ___ | ___ |
| 4. | Restricted and/or closures in effect or being considered. | ___ | ___ |
| 5. | No night operations in place for safety reasons. | ___ | ___ |

Total ___ ___

E. OWNERSHIP

Yes/No

- | | | | |
|----|---|-----|-----|
| 1. | Fire burning or threatening more than one jurisdiction. | ___ | ___ |
| 2. | Potential for claims (damages). | ___ | ___ |
| 3. | Conflicting management objectives. | ___ | ___ |
| 4. | Disputes over fire management responsibility. | ___ | ___ |

5. Potential for unified command. _____

Total _____

F. EXTERNAL INFLUENCES

1. Controversial wildland fire management policy. _____

2. Pre-existing controversies/relationships. _____

3. Sensitive media relationships. _____

4. Smoke management problems. _____

5. Sensitive political interests. _____

6. Other external influences. _____

Total _____

G. CHANGE IN STRATEGY

1. Change in strategy to control from confine or contain. _____

2. Large amount of unburned fuel within planned perimeter. _____

3. WFSA invalid or requires updating. _____

Total _____

H. EXISTING OVERHEAD

1. Worked two operational periods without achieving initial objectives. _____

2. Existing management organization ineffective. _____

3. IMT overextended themselves mentally and/or physically. _____

4. Incident action plans, briefings, etc., missing or poorly prepared. _____

Total _____

Signature _____

Date _____ **Time** _____

DELEGATION OF AUTHORITY

Audubon National Wildlife Refuge Complex
Coleharbor, ND

As of (Time) and (date) , I have delegated authority to manage the (Fire/Incident Name and Fire Number) , Audubon National Wildlife Refuge Complex, to Incident Commander (Name) and his incident management tea.

As Incident Commander, you are accountable to me for the overall management of this incident including it's control and return to local forces. I expect you to adhere to relevant and applicable laws, policies, and professional standards. While the suppression of the fire is your primary task, you are expected to do so in a manner that provided for the safety and well being of involved personnel. Consideration for the needs of local residents and communities is essential for successful management of the incident.

I am assigning (Name) As the line officer representative to act as liaison and provide any help you need. (S)He is authorized to speak for me in the event a decision is needed.

My specific considerations for management of this fire are:

1. Ensure the safety of firefighters, visitors, and public.
2. Protect private and refuge property to the extent possible
3. Minimize damage to environmental resources
4. Key resource considerations are: protecting rare, threatened, and endangered species; preserving as much wildlife habitat as possible; avoiding wildlife entrapment situations; protecting cultural resources; and limiting degradation of the Complex's aesthetic values.
5. Restrictions for suppression actions are no earthmoving equipment (dozers, discs, plows, graders) without approval of the Project Leader.
6. Manage the fire cost-effectively for the values at risk.
7. Provide training opportunities for Service personnel when ever possible in order to strengthen our organizational capabilities.

Signed: _____ Date: _____
Project Leader

APPENDIX P - MONITORING PROTOCOLS

RECOMMENDED FIRE MONITORING STANDARDS

REGION 6

The following are the recommended standards to be used when planning, implementing, and evaluating prescribed burns. These should be viewed as minimum values to be monitored and the information contained in this check list incorporated into a monitoring record sheet.

Planning and Preparation

Environmental Conditions Prior to the Burn

____ Photo Points Established

____ Fuel

____ Model(s)

____ Loading (By Size Class)

____ % Cover (Type/Model)

____ Continuity

____ Crown ratio

____ Depth of Fuel Bed

____ Other

____ Air Temperature (Maximum - Minimum to develop trends)

____ Relative Humidity (Maximum - Minimum to develop trends)

____ Wind Speed and Direction (Eye-level/20 Foot)

____ Fuel Moisture

____ Dead Fuel Moisture (Use of Fuel Sticks and/or Drying Ovens highly recommended)

____ Live Fuel Moisture (Fuel Models 2,4,5,7,10)

____ Soil Moisture (Dry, Moist, Wet)

____ Drought Indicator (Track One or More)

Execution

Environmental Conditions During the Burn

____ Date/Time

____ Air Temperature (Every 30 minutes)
____ Relative Humidity (Every 30 minutes)
____ Wind Speed and Direction (Eye Level) (Every 30 minutes)
____ Cloud Cover

____ Fuel Moisture (Indicate How Determined: Calculated, Actual)
____ Dead Fuel Moisture (Using above values, calculate every 30 minutes utilizing Tables and Worksheets, Nomograms, BEHAVE, etc.)
____ Live Fuel Moisture (Fuel Models 2,4,5,7,10 - Collect immediately prior to the burn and evaluate later)

Fire Behavior

____ Flame length (Head, Flank, Backing)
____ Rate of Spread (Forward, Flank, Backing)
____ Resistance to Control
____ Spotting Distance

Smoke/Air Quality

____ Mixing/Dispersal (Good, Fair, Poor)
____ Trajectory of Column (Surface/Upper Level)
____ Duration (Active Burning/Smoldering)
____ Problems

Note: It is recommended that photos be taken to document smoke dispersal.

Post Burn

First Order Fire Effects

- _____ Photo Point
- _____ Percent of Area Burned
- _____ Percent of Fuels Consumed (By Fuel Loading Size Class, when possible)
- _____ Percent of Thatch/Duff Consumed
- _____ Scorch Height
- _____ Mortality

Note: The information in the first two categories will be used to determine the amount of particulate matter produced, and may/will be used by State Air Quality Regulators.